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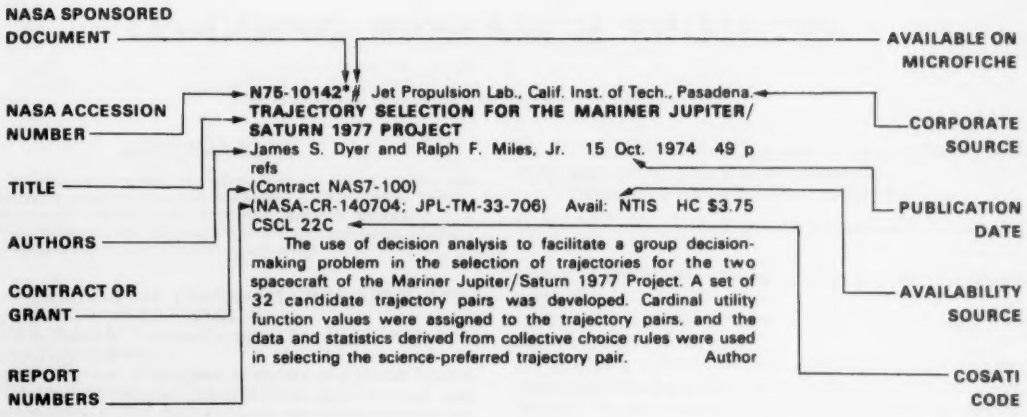
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N75-10142*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
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TRAJECTORY SELECTION FOR THE MARINER JUPITER/ SATURN 1977 PROJECT
TITLE
James S. Dyer and Ralph F. Miles, Jr. 15 Oct. 1974 49 p refs
PUBLICATION DATE
AUTHORS
(Contract NAS7-100)
CONTRACT OR GRANT
(NASA-CR-140704; JPL-TM-33-706) Avail: NTIS HC $3.75
AVAILABILITY SOURCE
CSCL 22C
COSATI CODE
The use of decision analysis to facilitate a group decision-making problem in the selection of trajectories for the two spacecraft of the Mariner Jupiter/Saturn 1977 Project. A set of 32 candidate trajectory pairs was developed. Cardinal utility function values were assigned to the trajectory pairs, and the data and statistics derived from collective choice rules were used in selecting the science-preferred trajectory pair. Author
REPORT NUMBERS

ON-GOING RESEARCH PROJECTS

This is a listing of research projects—not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research And Support Facilities (air). For Related Information See Also Astronautics.

1.0001, EXISTING AIR TRANSPORTATION APRON-TERMINAL AREA COMPLEX CONCEPTS
UNKNOWN, Ralph M. Parsons Company, *Los Angeles, California* 90054 (036323 (HRB NO.))

The investigation is designed to gather and collect known data on significant existing air transportation apron-terminal area complex concepts, analyze each concept, and prepare a report including this analysis, showing the advantages and disadvantages of each.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.A.A.

1.0002, RUNWAY MARKING FOR CATEGORY II/III OPERATIONS
C. HARPER, U.S. Natl. Aero. & Space Adm., Ames Research Center, *Moffett Field, California* 94035 (045420 (HRB NO.))

This agreement is for the use of a Fog Chamber which shall be used to provide data and information on the visual aspects of runway markings during daytime in Category II and IIIa visibilities conditions. The usefullness of markings for safe approach and landing in these low visibility conditions shall be determined when required Category II lighting is not installed. In addition, the limit of usefulness of markings that have deteriorated due to aircraft tire marks, weather aging, and snow and rainfall shall be determined. The marking patterns studied shall include U.S. Standard patterns and ICAO patterns with solid and striated application of marking.

Document provided to S.S.I.E. by the T.R.A.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.A.A.

1.0003, RESEARCH IN FLIGHT DYNAMICS
H. LIEBOWITZ, George Washington University, School of Engin. & Appl. Sci., *Washington, District of Columbia* 20006 (NSG 1161; 505-06-93)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0004, PROGRAM VERIFICATION FOR COMMERCIAL AIRCRAFT APPLICATIONS
W.D. MAURER, George Washington University, School of Engin. & Appl. Sci., *Washington, District of Columbia* 20006 (NSG 1170; 513-52-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0005, AERIAL FILM DATA REDUCTION METHODOLOGY
LUM, U.S. Dept. of Transportation, Federal Highway Administration, *Washington, District of Columbia* 20590 (020589 (HRB NO.))

An attempt is made to improve methodology for semi-automatic reduction of traffic data from aerial film.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

1.0006, DYNAMIC LOADING EFFECTS ON PAVEMENT DESIGN
UNKNOWN, United Air Lines Incorporated, *Chicago, Illinois* 60666 (038184 (HRB NO.))

A Boeing 727 Aircraft (with crew) will be rented on an exclusive use base for a maximum of eighty (80) flight hours. The aircraft will be utilized in a project at NAFEC to determine dynamic loading effects on pavement design. The data will provide for updating specifications for runway construction for heavier jet aircraft. The Corps of Engineers has instrumented the reconstructed runway at NAFEC in order to obtain information on dynamic loading of subgrade and paving of runways under heavy aircraft loadings. The aircraft being rented will be instrumented to record fore, aft, and side thrusts on landing, taxiing, and take- offs. The runway instrumentation will record the loadings on the runway paving and subgrades.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.A.A.

1.0007, FLUTTER SUPPRESSION AND GUST ALLEVIATION USING ACTIVE CONTROLS
E. NISSIM, Technion, *Haifa, Israel* (NSG 7072; 501-23-32)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0008, COMPUTER AND WIND TUNNEL DEVELOPMENT OF FLAPS AND CONTROL SURFACES FOR ADVANCED TECHNOLOGY GENERAL AVIATION AIRFOILS
W.H. WENTZ, Wichita State University, School of Engineering, *Wichita, Kansas* 67208 (NSG 1165; 501-06-05)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0009, MULTIDIMENSIONAL SCALING TECHNIQUES APPLIED TO FLIGHT MANAGEMENT CONCEPT
UNKNOWN, Tufts University, Graduate School, *Medford, Massachusetts* 02155 (NCA 2-85401; 504-09-33)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0010, DEVELOPMENT OF AN INSTRUMENT PAYLOAD FOR BALLOON, ROCKET, OR AIRCRAFT
J.G. ANDERSON, Univ. of Michigan, Graduate School, *Ann Arbor, Michigan* 48104 (NAS 9-14609; 989-15-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0011, DEVELOP A NEW PAVEMENT DESIGN METHODOLOGY
UNKNOWN, U.S. Army, Waterways Experiment Station, *Vicksburg, Mississippi* 39180 (045431 (HRB NO.))

This agreement is to furnish all personnel, materials and equipment to develop a new pavement design methodology based on a 'rational' approach as opposed to existing empirical methods in accordance with FAA-ER-430-002 titled 'New Pavement Design Methodology.'

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.A.A.

1.0012, CRITERIA FOR NEW AIRPORT PAVEMENTS
UNKNOWN, U.S. Army, Waterways Experiment Station, *Vicksburg, Mississippi* 39180 (045474 (HRB NO.))

This agreement is for the purpose of conducting a program for the development of criteria for new airport pavement.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.A.A.

1.0013, SUBCRITICAL AIRFOIL DEVELOPMENT
R.H. LIEBECK, McDonnell Douglas Astron. Co., *St. Louis, Missouri* 63166 (DF135290; F33615-75-C-3115)

Advanced USAF high altitude long endurance remotely piloted vehicles will require the use of optimized subcritical airfoil sections to meet proposed mission performance specifications. The objective of this program is to develop a matrix of ten optimized subcritical airfoils for use on high altitude long endurance RPV's.

The Douglas-Liebeck subcritical airfoil program will be used to define an optimized airfoil pressure distribution for a given Reynolds number, flow condition and design lift coefficient. Imputing this data, the Douglas-James airfoil design procedure will be used to compute the corresponding airfoil shape. Finally the Douglas-Madaam airfoil analysis program will be used to theoretically determine the off-design performance of each airfoil developed.

Supporting agency address information: AF Flight Dynamics Laboratory FXMC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0014, AN ADAPTIVE LEARNING CONTROL SYSTEM FOR AIRCRAFT
R. MEKEL, City University of New York, Undergraduate School, *Jamaica, New York* (NSG 1169; 723-01-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0015, CALIBRATION OF IPCS ENGINES
C. MEYER, U.S. Natl. Aero. & Space Adm., Airbreathing Engines Division, *Cleveland, Ohio* 44135 (RTOP 505-05-11)

Description: The engines will be mounted in direct-connect installations in PSL. In support of the propulsion system control program, two TF30-P-9 engines will be calibrated relative to nominal performance in inlet-pressure distortion sensitive in the first phase, followed by later evaluations of one engine and control system prior to flight; a range of simulated flight conditions, transients, and inlet pressure distortions (induced with the air-jet system) will be included.

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0016, PERFORMANCE OF J-85-21 ENGINE
C. MEYER, U.S. Natl. Aero. & Space Adm., Airbreathing Engines Division, *Cleveland, Ohio* 44135 (RTOP505-05-21)

Description: To evaluate the performance and dynamic response of a J85-21 afterburning turbojet engine and its components over a range of engine operating conditions when subjected to a simulated flight environment. Planned accomplishments include a complete mapping of the aeromechanical instability regions of the compressor.

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0017, INVESTIGATION OF THE AERODYNAMIC CHARACTERISTICS OF A NEW GENERAL AVIATION AIRFOIL IN FLIGHT
G.M. GREGOREK, Ohio State University, School of Engineering, *Columbus, Ohio* 43212 (NSG 1184)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0018, STUDY OF TANDEM BLADES FOR HELICOPTER ROTORS
E. LUMSDAINE, Univ. of Tennessee, School of Engineering, *Knoxville, Tennessee* 37916 (NSG 1171; 505-10-26)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0019, QUALITY CONTROL, WIDE-BODY JET TRANSPORT VGH RECORDS
UNKNOWN, Coll. of William & Mary, Undergraduate School, *Newport News, Virginia* 23606 (NAS 1-13913; 505-08-20)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, AN ANALYSIS OF SOLID ROCKET MOTOR THRUST IMBALANCE
UNKNOWN, Auburn University, Graduate School, *Auburn, Alabama* 36830 (NCA 8-108; 984-15-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

2.0002, MECHANISMS OF EMITTER SURFACE DAMAGE DURING EHD COLLOID PARTICLE GENERATION AND ACCELERATION
J. PEREL, Phrasor Technology, *Altadena, California* 91001 (DF040730; F44620-75-C-0056)

Future AF satellite missions will require for attitude control and stationkeeping reliable high specific impulse thrusters whose performance does not show unwarranted degradation. This research on emitter damage occurring during colloid charged particle generation will aid understanding of damage mechanisms and provide operational type models useful toward improving thruster design and/or operation. The program responds to RO 5.1 and encompasses theoretical and experimental studies of various damage mechanisms such as sputtering bombardment by negative particles, arc and spark erosion, and erosion due to cavitation. Corrosion due to electrochemical action of halogens in the propellant fluid and inertness of platinum under high stress conditions will also be examined as possible contributory mechanisms. A further objective of the program will be to characterize emitter damage mechanisms as thruster operative or facility induced phenomena. Investigations will center on the electrohydrodynamic (EHD) process in determining dynamic activity occurring in the region of the propellant fluid/metal interface, including the area of damage. Theoretical models will be formulated and experimentally validated which realistically describe and predict emitter damage during EHD particle generation, define the colloid beam generating mechanisms and provide the basis for making colloid emitter material and operating environment recommendations.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd, Arlington, Va 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

2.0003, COST-BENEFITS OF SPACE COMMUNICATIONS TECHNOLOGY
UNKNOWN, Georgia Inst. of Technology, Graduate School, *Atlanta, Georgia* 30332 (NAS 3-19700; 644-04-06)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, STRUCTURE FUNCTION RELATIONSHIPS IN THERMOPHILE MEMBRANES
UNKNOWN, Calif. State Univ. & Colleges, Graduate School, *Fullerton, California* 92631 (NCA 2-53601; 192-55-64)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

3.0002, TOXIC RISK ASSESSMENT OF MANGANESE COMBUSTION PRODUCTS
UNKNOWN, Univ. of San Francisco, Graduate School, *San Francisco, California* 94117 (NCA 2-70504; 997-00-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

3.0003, MOLECULAR BEAM INVESTIGATION OF ENERGY TRANSFER AND CHEMICAL REACTIVITY
J.B. FENN, Yale University, School of Engineering, *New Haven, Connecticut* 06520 (DF033900; AF-AFOSR-2236-72)

Future AF flight operations will exploit advances in the technologies of propulsion and power. The performance characteristics of combustion (and other energy conversion) systems depend on kinetic processes occurring on the molecular scale. This research seeks observation and understanding of these underlying processes whereby energy is exchanged and redistributed. Experiments are performed in which a collimated beam of molecules is passed through and scattered by a cloud of target molecules. These experiments provide information on the forces which molecules exert on each other during the binary encounters or collisions which are responsible for such important processes in gases as chemical reaction and the diffusional transport of momentum, mass and energy. Specifically measured are the velocity dependencies of the total scattering cross-sections for a wide variety of collisional partners, including polyatomic molecules. Correlations are sought between momentum transfer, structure, and chemical reactivity. Planned for ultimate study also are experiments on scattering of dimers and other polymers of condensing species. Experiments to examine the effects of molecular orientation upon the scattering cross section and to examine changes of state and structure of the target molecule as a result of collisons are also contemplated.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd, Arlington, Va 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0004, A CHROMATOGRAPHIC ANALYSIS OF THE RESPONSE OF POLYMERIC FIRE-DETECTION DEVICES TO COMBUSTION
S.D. SENTURIA, Mass. Inst. of Technology, School of Engineering, *Cambridge, Massachusetts* 02139 (NSG 3061; 501-38-13)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

3.0005, INVESTIGATIONS OF STIMULATED SCATTERED PROCESSES AS POSSIBLE MECHANISMS IN LASER INDUCED DAMAGE IN NONLINEAR OPTICAL MATERIALS
C. YU, North Carolina A & T St. Univ., Graduate School, *Greensboro, North Carolina* 27411 (NSG 1147; 340-00-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

3.0006, SYNTHESIS OF SPECIALIZED ORGANIC COMPOUNDS
P.B. STICKNEY, Wilberforce University, Undergraduate School, *Wilberforce, Ohio* 45384 (NSG 3067; 340-00-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

3.0007, COMPARISON OF THE FRACTURE TOUGHNESS OF METAL-MATRIX COMPOSITES AS DETERMINED BY FOUR DIFFERENT TECHNIQUES
M.A. WRIGHT, Univ. of Tennessee, School of Engineering, *Knoxville, Tennessee* 37916 (NSG 1163; 505-02-31)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

3.0008, THE STRUCTURAL BEHAVIOR OF ADVANCED COMPOSITE MATERIALS
M.W. HYER, Old Dominion University, Graduate School, *Norfolk, Virginia* 23508 (NSG 1167; 505-02-41)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, OPTIMIZATION OF SOLAR CELLS FOR HIGH INTENSITY ILLUMINATION
UNKNOWN, Univ. of Arizona, Graduate School, *Tucson, Arizona* 85721 (NCA 2-40502; 506-25-32)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0002, DEVELOPMENT OF FLOW SEEDING METHODS IN HIGHSPEED WIND TUNNELS
UNKNOWN, Univ. of Arkansas, Graduate School, *Little Rock, Arkansas* 72005 (NCA 2-45501; 505-06-15)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0003, ELECTRON BEAM SURFACE ANALYSIS
UNKNOWN, Univ. of California, Graduate School, *Berkeley, California* 94720 (NCA 2-50510; 506-16-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0004, PIONEER VENUS MAGNETOMETER
C.T. RUSSELL, Univ. of California, Graduate School, *Los Angeles, California* 90024 (NAS 2-8808; 825-20-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0005, STUDY OF ROLLING ELEMENT DYNAMIC INTERACTIONS WITH SEPARATORS AND RACEWAY PATHS
L.J. NYPAN, Calif. State Univ. & Colleges, School of Engineering, *Northridge, California* 91324 (NSG 3065; 505-04-41)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0006, DESIGN STUDY FOR ENERGETIC GAMMA RAY EXPERIMENT TELESCOPE
R. HOFSTADTER, Stanford University, School of Human. & Sciences, *Palo Alto, California* 94305 (NAS 5-20987; 188-78-60)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0007, STUDY OF FILTER MECHANIZATIONS FOR VIDEO INERTIA POINTING SYSTEM MICROPROCESSOR
UNKNOWN, Stanford University, Graduate School, *Palo Alto, California* 94305 (NCA 2-45518; 506-19-15)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0008, HARD X-RAY IMAGING SYSTEM STUDY
L.E. PETERSON, Univ. of California, Graduate School, *San Diego, California* 92038 (NAS 5-22375; 356-38-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0009, PARAMETERIZATION AND BOUNDARY LAYER PROCESSES
UNKNOWN, Calif. State Univ. & Colleges, Graduate School, *San Jose, California* 95114 (NCA 2-75520; 175-21-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0010, DESIGN AND DEVELOPMENT OF A PIONEER VENUS ORBITING ULTRAVIOLET SPECTROMETER
A.I. STEWART, Univ. of Colorado, Graduate School, *Boulder, Colorado* 80302 (NAS 2-8816)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0011, NON-LINEAR TRANSIENT EVAPORATION AND CONDENSATION FROM A DROPLET
D.Y. LOU, Univ. of Delaware, School of Engineering, *Newark, Delaware* 19711 (ENG75-10169)

Using the moment method of Maxwell, an analytical study will be performed for the problem of transient condensation and evaporation of spherical liquid (or solid) droplets when the liquid (or solid) phase is not in equilibrium with its surrounding vapor. Unlike the linearized theories, the result of this investigation of the mass flux to or from the droplet surface will be obtained for a general case of finite temperature difference between the droplet and its vapor. Realistic predictions of the rate of condensation or evaporation phenomena will be obtained. Applications of the results exist in the condensation of steam in turbomachinery, the sublimation of solid particles in rocket propulsion, in power generation devices and in various industrial chemical processes. The present study will also contribute to a better understanding of safety problems in liquid-cooled nuclear reactors involving rapid vaporization of coolant due to insufficient cooling and of droplet growth phenomena in cloud physics.

SUPPORTED BY U.S. Natl. Science Foundation

4.0012, NON-GAUSSIAN CLASSIFICATION PROCEDURES OF PATTERN RECOGNITION
C.P. TSOKOS, Univ. of South Florida, School of Natural Sciences, *Tampa, Florida* 33620 (NSG 1159; 506-90-21)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0013, COMBINED ANALYTICAL-EXPERIMENTAL INVESTIGATION OF SHORT, ANNULAR, SUBSONIC DIFFUSERS
UNKNOWN, Purdue University, Graduate School, *Lafayette, Indiana* 47907 (NCA 2-05501; 505-04-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0014, RESEARCH TO ACHIEVE CENTIMETER LASER RANGING ACCURACY TO EARTH SATELLITES FOR EARTH PHYSICS APPLICATIONS
C.O. ALLEY, Univ. of Maryland, School of Arts & Sciences, *College Park, Maryland* 20742 (NSG 5062; 312-20-30)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0015, SPECTROHELIOMETER FOR SOLAR MAXIMUM MEASUREMENTS
E.M. REEVES, Harvard University, School of Arts & Sciences, *Cambridge, Massachusetts* 02138 (NAS 5-22343; 826-12-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0016, SOLAR EUV-XUV SOFT X-RAY TELESCOPE STUDY
G.L. WITHBROE, Harvard University, Graduate School, *Cambridge, Massachusetts* 02138 (NAS 5-22374; 356-38-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0017, INTERFEROMETRIC BROAD BAND GRAVITATIONAL ANTENNA
R. WEISS, Mass. Inst. of Technology, School of Science, *Cambridge, Massachusetts* 02139 (MPS75-04033)

This proposal is for an NSF grant to continue the development of a broadband gravitational radiation antenna that uses free masses as antenna elements. The masses are the mirror mounts of a laser illuminated Michelson interferometer which is used to measure the gravitationally induced strains in space. Although the proposed scheme is in some regards technically more difficult than resonant bar antennas, it holds the promise of extending the search for gravitational radiation to a sensitivity such that one may expect to detect the radiation from various astronomical sources. The first step is a small prototype interferometric antenna with 9 meter arms. This prototype is at least 1000 times more sensitive to a large class of astronomical sources of gravitational radiation than existing resonant bar antennas; however, any reasonable estimates of the source strengths of known and imagined sources still indicate that the prototype antenna will only be able to set upper limits on the gravitational radiation intensity. It is hoped that the techniques developed can be used in interferometric antennas with baselines of the order of a kilometer or more, since the sensitivity of this type of antenna increases with the square of the baseline.

SUPPORTED BY U.S. Natl. Science Foundation

4.0018, ANALYSIS OF OGO-6 PHOTOMETER
T.M. DONAHUE, Univ. of Michigan, School of Lit. Sci. & the Arts, *Ann Arbor, Michigan* 48104 (NSG 7137)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0019, DESIGN OF A SOLAR POWERED WATER HYACINTH DRYER
R.E. FORBES, Mississippi St. University, School of Engineering, *Mississippi State, Mississippi* 39762 (NAS13-10; 644-02-02)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0020, REMOTE MONITORING INSTRUMENTATION EVALUATION
J.A. HODGESON, U.S. Environ. Protection Agcy., Natl. Environ. Research Center, *Las Vegas, Nevada* 89114 (ROAP 21BEM)

The objective of the project is to provide a research report that fully describes evaluations of instruments. The results of the

evaluation along with a recommendation of the utility of the instrument will be included in the report.

The approach will be to evaluate selected remote monitoring instruments by intercomparison of the data obtained with these techniques with data obtained by presently accepted in situ techniques.

Presently, tests are underway to compare airborne LIDAR measurements of mixing height and fine particulates with results obtained by conventional in situ techniques.

SUPPORTED BY U.S. Environ. Protect. Agency - O.R.M.

4.0021, REMOTE MONITORING OF WATER QUALITY PARAMETERS
S.H. MELFI, U.S. Environ. Protection Agcy., Natl. Environ. Research Center, *Las Vegas, Nevada* 89114 (03 ABB 1HA326)

The project objective is the development of state-of-the-art remote monitoring instrumentation and techniques for water quality monitoring.

Emphasis is on the development of instrumentation rather than basic research. Constraints on project are that all systems will be down- looking from an airborne platform and will use lasers as the interrogating sources.

A review has been completed on laser techniques in water quality monitoring. A device is being constructed for use in laser stimulated fluorescence studies. Both tracer dye and chlorophyll concentrations will be monitored from an airborne platform during calendar year 1975. Future studies will include applications of Raman scattering of laser signals for the remote monitoring of chemical pollutants.

SUPPORTED BY U.S. Environ. Protect. Agency - O.R.M.

4.0022, STUDY OF THE FLUID MECHANICS OF A RADIAL TURBINE SCROLL
W. TABAKOFF, Univ. of Cincinnati, School of Engineering, *Cincinnati, Ohio* 45221 (NSG 3066; 505-90-83)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0023, NACELLE BOATTAIL FLOWS
E. RESHOTKO, Case Western Reserve Univ., School of Engineering, *Cleveland, Ohio* 44106 (NSG 3058; 505-04-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0024, INTERACTIVE COMPRESSOR FLOW-FIELD CALCULATIONS
E. RESHOTKO, Case Western Reserve Univ., School of Engineering, *Cleveland, Ohio* 44106 (NSG 3062; 505-90-9X)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0025, MULTIVARIABLE CONTROL THEORY WITH APPLICATION TO AIRBREATHING PROPULSION SYSTEMS
G.G. LEININGER, Univ. of Toledo, School of Engineering, *Toledo, Ohio* 43606 (NSG 3063; 505-05-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0026, DEVELOPMENT OF INVERSE TRANSONIC AIRFOIL DESIGN METHODS INCLUDING BOUNDARY LAYER AND VISCOUS FLOWS
L.A. CARLSON, Texas A & M University System, Graduate School, *College Station, Texas* 77843 (NSG 1174; 505-06-31)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0027, CANDIDATE HAND CONTROLLER DESIGN
D.E. SHEER, Univ. of Houston, School of Arts & Sciences, *Houston, Texas* 77004 (NAS 9-14532; 970-53-50)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0028, DESIGN AND APPLICATION OF A ONE METER UV-OPTICAL TELESCOPE FOR SPACELAB ASTRONOMY MISSIONS
R.W. OCONNELL, Univ. of Virginia, School of Arts & Sciences, *Charlottesville, Virginia* 22903 (NAS 5-22346; 356-41-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0029, EXPERIMENTAL AND ANAYLTICAL STUDIES IN FLUIDICS
G.L. GOGLIA, Old Dominion University, School of Engineering, *Norfolk, Virginia* 23508 (NSG 1177)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0030, HIGH RESOLUTION SPECTROSCOPY FOR A ONE METER CLASS UV-OPTICAL TELESCOPE FOR SPACELAB ASTRONOMY MISSIONS
C.M. ANDERSON, Univ. of Wisconsin, Graduate School, *Madison, Wisconsin* (NAS 5-22349; 356-41-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production And Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, STUDY DEVELOPMENT OF IMPROVED PHOTOINTERPRETATIVE TECHNIQUES APPLIED TO WHEAT IDENTIFICATION
J.D. NICHOLS, Univ. of California, Graduate School, *Berkeley, California* 94720 (NAS 9-14565; 658-10-20)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0002, APPLYING COMPUTER/SCANNING LAND-USE DATA IN A MESO-SCALE METEOROLOGY PROGRAM
UNKNOWN, Calif. State Univ. & Colleges, Graduate School, *San Jose, California* 95114 (NCA 2-75518; 175-21-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0003, A MESO-SCALE GLACIO-CLIMATOLOGICAL STUDY OF THE NORTH WATER AREA
F. MULLER, McGill University, *Montreal 101, Quebec, Canada* (GV-40404 A01)

The main observation program, built up to its peak during 1973, will be continued throughout this proposal period, in an effort to obtain simultaneous measurements for the North Water region. These include: 1) daily radiosonde ascents at two stations (Carey and Coburg); 2) 6-hourly synoptic ground observations (Coburg, Carey and Herschel); 3) weekly sea ice profiles (thickness, temperature, regional extent, general movement); 4) once a month one full day of synoptic observations at all eleven automatic satellite stations. Other parts of the project include remote sensing aimed at assessing the amount and position of open water, melting zones, refreezing area and pressure ridges of the sea ice using satellite imagery and once-monthly aircraft flights. The isotope program and analysis to determine the origin of the precipitation of the North Water area will also be continued by sampling from pits and ice cores on six ice caps sur-

rounding North Water down to a depth of 30 meters, containing an estimated 100 years of precipitation records. The numerical model of atmospheric processes over the North Water area will be expanded into the third dimension. This will be the last year of operation and final year of NSF support for this project.

SUPPORTED BY U.S. Natl. Science Foundation

5.0004, SOLAR ENERGY MICROCLIMATE STUDY
UNKNOWN, Colorado State University, Graduate School, *Fort Collins, Colorado* 80521 (NAS 5-22372; 647-20-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0005, ASSESSMENT OF GEOPHYSICAL FLOWS FOR ZERO-GRAVITY SIMULATION
C.B. WINN, Colorado State University, School of Engineering, *Fort Collins, Colorado* 80521 (NAS 8-31347; 175-11-71)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0006, ANALYSIS OF UF6 BREEDER REACTOR POWER PLANTS
J.R. WILLIAMS, Georgia Inst. of Technology, School of Engineering, *Atlanta, Georgia* 30332 (NSG 1168; 503-10-03)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0007, SYNTHETIC APERTURE RADAR WATER RESOURCE STUDY
UNKNOWN, Univ. of Kansas, Graduate School, *Lawrence, Kansas* 66044 (NAS 5-22384; 683-75-31)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0008, INVESTIGATION OF SOUND ABSORBERS FOR THE EFFECTIVE ABSORPTION OF LOW FREQUENCY NOISE
K.U. INGARD, Mass. Inst. of Technology, School of Engineering, *Cambridge, Massachusetts* 02139 (036943 (HRB NO.))

Project will address the question of sound absorption, with particular emphasis on the study of a certain class of absorbers which appear quite promising for effective absorption of low-frequency noise.

Document provided to S.S.I.E. by the T.R.A.I.S.

SUPPORTED BY U.S. Dept. of Transportation - Off. Sec.

5.0009, FEASIBILITY STUDY OF DOPPLER SIGNATURE DETECTION OF INCIPIENT TORNADOES
UNKNOWN, Univ. of Michigan, Graduate School, *Ann Arbor, Michigan* 48104 (NAS-54214A; 175-21-45)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0010, NEW MADRID (MISSOURI) EARTHQUAKE STUDY
R.T. SAUCIER, U.S. Army, Waterways Experiment Station, *Vicksburg, Mississippi* 39180 (31121)

Objective: Liquefaction phenomena resulting primarily from the 1811-12 New Madrid earthquake are the focal point of this investigation, and they are being examined with several goals in mind, i.e.: (a) to establish the relation between the intensity of ground motion and the susceptibility of soils to liquefaction in explaining the distribution and intensity of phenomena to epicentral positions; (b) to develop recognition criteria for liquefaction phenomena, both on the surface and in the subsurface, to accurately delineate the extent of the new Madrid earthquake zone and possibly identify in alluvial areas regions that have been affected by unrecorded major earthquakes; and (c) to develop evidence as to possible major earthquakes in the New Madrid region predating 1811, establish their age by archaeological and/or geological methods, and develop estimates of recurrence intervals for major earthquakes in the region.

Approach: Methodology employed in the investigation includes extensive and intensive aerial photointerpretation, collection and analysis of literature and historic accounts, limited field reconnaissance, and careful examination of geological, historical, and archaeological technical data from new perspectives, particularly in regard to establishing relative or absolute ages for the liquefaction phenomena. All relevant data are being interpreted to determine how the phenomena are related in distribution, pattern, configuration, and origin to such aspects as epicentral position, ground slope, drainage pattern intensity and configuration, thickness of fine-grained overburden, and substratum soil density and grain size distribution. Since major field investigation is precluded because of the scope of this effort, engineering soils data and subsurface information will only be gathered from existing sources.

SUPPORTED BY U.S. Dept. of Defense - Army

5.0011, STUDY OF ZERO-GRAVITY ATMOSPHERIC CLOUD PHYSICS LAB CHAMBER DEVELOPMENT
P. SQUIRES, Univ. of Nevada, School of Arts & Sciences, *Reno, Nevada* 89507 (NAS 8-31470; 645-10-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0012, STRATOSPHERIC AEROSOL AS POSSIBLE SOURCES AND SINKS OF TRACE GASES
C.S. KIANG, State University of New York, Graduate School, *Albany, New York* 12203 (NSG 2080; 989-15-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0013, STUDY OF COMMUNITY ANNOYANCE WITH AIRCRAFT NOISE IN THE VICINITY OF JFK AIRPORT
P.N. BORSKY, Columbia University, School of Public Health, *New York, New York* 10032 (NSG 1164; 504-09-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0014, WINDPOWER
UNKNOWN, Physics Dynamic Research, *Amsterdam, the Netherlands*

A preliminary impression has been obtained about types of rotors which could be used in industrial plants, and the contribution which the United Machine Factories could give in software and hardware of complete windpower installations. Research and development on testbed installations will be necessary before realistic prototype designs (in stepped-up sizes) can be made. Fokker-VEW has completed a series of experiments on a small scale model of a vertical axis wind-turbine (1.20 m). A larger model (5 m) is under construction; tests will start at the end of 1975. Proposal for design and construction of a 12 m test- installation with a subsequent research program is in preparation.

SUPPORTED BY United Machine Factoreis - Amsterdam

5.0015, ASSESSMENT OF NOISE FROM LIGHT AIRCRAFT
K.P. SHEPHERD, Univ. of Utah, Graduate School, *Salt Lake City, Utah* 84112 (NSG 1160; 504-09-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0016, SPACE AND ENERGY CONSERVATION HOUSING PROTOTYPE UNIT DEVELOPMENT
D.R. SUNSHINE, Hampton Institute, Graduate School, *Hampton, Virginia* 23368 (NSG 1162; 141-95-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0017, INVESTIGATION OF CURRENT UNIVERSITY RESEARCH CONCERNING ENERGY CONVERSION AND CONSERVATION IN SMALL SINGLE-FAMILY DWELLINGS
G.R. CROSSMAN, Old Dominion University, School of Engineering, *Norfolk, Virginia* 23508 (NSG 1172; 141-95-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0018, MODELLING OF THE STABLE ATMOSPHERIC BOUNDARY LAYER
UNKNOWN, Univ. of Washington, Graduate School, *Seattle, Washington* 98105 (NCA 2-50501; 175-21-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, INVESTIGATION OF ALTERNATIVE INSTRUCTIONAL STRATEGIES FOR BASIC INSTRUMENT FLIGHT TRAINING IN T-40
D.M. TYLER, U.S. Air Force, Human Resources Laboratory, *Chandler, Arizona* 85224 (DF222040)

To develop and evaluate alternative instructional strategies for application in flight simulator training programs. The primary goal of this research will be to investigate the effects of three instructional strategies (1. Diagnostic, 2. Error detection, and 3. Self-taught) upon learning and transfer of training conditions of task loading. The results of this study will be applied in determining optimum instructor pilot procedures for use with the Air Training Command Instrument Flight Simulator.

The T-40/Automatic Data Acquisition and Control System will be used for the measurement of the performance of subjects under alternative instructional strategies and conditions of no task load and task loading. This study will be carried out in the T-40 simulator. The required flight simulation capabilities, experimental control of the learning environment and pilot performance measurement will be provided by the T-40/ADACS equipment integration.

Supporting agency address information: AF Human Resources Laboratory FTT, Williams AFB, Arizona 85224

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0002, ASUPT OPERATIONAL UTILIZATION TEST
R.R. WOODRUFF, U.S. Air Force, Human Resources Laboratory, *Chandler, Arizona* 85224 (DF222090)

This work unit establishes the first in a series of operational tests to evaluate the products of ASUPT research. The primary objective of this test is to demonstrate the potential benefits from utilization of an ASUPT-class simulator within Air Force UPT. Related subsidiary objectives are to provide baseline data for syllabus research to develop information on training media usage, hardware configurations, and scheduling, and to begin determination of the optimal employment of ASUPT capabilities.

Four groups of eight randomly-selected UPT students will be subjects. The four groups will receive training in ASUPT to proficiency in various T-37 syllabus phases. Use of four groups will permit tight scheduling of ASUPT while insuring that ASUPT student training will remain abreast of regular T-37 training. When their ASUPT training is complete they will be instructed in the T-37, advancing on a proficiency basis. Basic evaluation will be the transfer of ASUPT training to the T- 37. Participating IPS will answer questionnaires about simulation and the simulator syllabus.

Supporting agency address information: AF Human Resources Laboratory FTS, Williams AFB, Arizona 85224

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0003, MOTIVATIONAL FACTORS IN DETECTION, MULTI-SOURCE MONITORING AND HUMAN TRACKING
UNKNOWN, Univ. of California, Graduate School, *Berkeley, California* 94720 (NCA 2-50508; 504-09-42)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0004, STUDIES ON THE LACTOGENIC ACTIVITY OF HUMAN PLASMA FRACTIONS
UNKNOWN, Univ. of California, Graduate School, *Berkeley, California* 94720 (NCA 2-50509; 970-21-16)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0005, ANALYSIS OF EEG AND OTHER PHYSIOLOGICAL DATA
UNKNOWN, Univ. of California, Graduate School, *Davis, California* 95616 (NCA-2-80504; 970-21-61)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0006, BLOOD PROTEIN AND RED CELL TURNOVER RATE STUDIES IN DOGS
UNKNOWN, Univ. of California, Graduate School, *Davis, California* 95616 (NCA 2-80505; 970-21-61)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0007, PHYSIOLOGY OF EXTREMELY HALOPHILIC BACTERIA
UNKNOWN, Univ. of Santa Clara, Graduate School, *Santa Clara, California* 95053 (NCA 2-85509; 192-55-64)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0008, ASTP/COSMOS FUNDULUS EMBRYO DEVELOPMENT EXPERIMENT
J.R. KEEFE, Univ. of Louisville, Graduate School, *Louisville, Kentucky* 40208 (NAS 9-14632; 948-60-91)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0009, INTERMOLECULAR RECOGNITION BETWEEN NUCLEOTIDES AND AMINO ACIDS
UNKNOWN, Univ. of Maryland, Graduate School, *College Park, Maryland* 20740 (NCA 2-20403; 192-55-64)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0010, TRAINING GRADUATE STUDENTS IN SPACE-RELATED SCIENCES AND ENGINEERING
S. CHANDRA, North Carolina A & T St. Univ., School of Engineering, *Greensboro, North Carolina* 27411 (NGT 34-012-750; 010-00-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0011, IN-HOUSE RESEARCH SUPPORT
R. CAMERON, U.S. Air Force, Human Resources Laboratory, *Dayton, Ohio* 45433 (DF227310)

The objective is to develop methods, techniques and equipments to support exploratory and advanced development programs. Developments will be both in hardware and software and will support research in such areas as (1) pilot performance measurement, (2) computer image generation, (3) visual display evaluation, (4) system sensor simulation, (5) computational technology applicable to flight simulation, and (6) performance and training requirements for remote operator tasks.

Efforts will continue to improve and update the research facility used in carrying out in-house exploratory and advanced development programs of the division. A display system and additional computer storage will be procured to support programs on sensor simulation. A remote operator's task station will be designed and fabricated to provide the capability to conduct research on remote operator tasks. Computer simulation models will be developed along with specialized equipments to support the Division's research effort.

Supporting agency address information: AF Human Resources Laboratory ASI, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0012, ASTP/COSMOS FUNDULUS EMBRYO DEVELOPMENT EXPERIMENTS
J.M. OPPENHEIMER, Bryn Mawr College, School of Arts & Sciences, *Bryn Mawr, Pennsylvania* 19010 (NAS 9-14640; 970-54-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0013, ETIOLOGICAL STUDY OF MOTION SICKNESS BY USING SUBHUMAN PRIMATES
M. IGARASHI, Baylor University, School of Medicine, *Houston, Texas* 77025 (NAS 9-14546; 970-51-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0014, DEVELOPMENT OF AUTOMATED ANALYTICAL CAPABILITY FOR THE EARLY DETECTION OF DIABETES MELLITUS
A. ZLATKIS, Univ. of Houston, School of Arts & Sciences, *Houston, Texas* 77004 (NAS 9-14534; 141-95-02)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0015, TRAINING OF UNDERGRADUATE STUDENTS IN THE SPACE-RELATED SCIENCES AND ENGINEERING
A.E. GREAUX, Texas A & M University System, School of Engineering, *Prairie View, Texas* 77445 (NGT 44-033-750; 010-00-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0016, BREATHING SYSTEMS FOR EMERGENCY ESCAPE FROM MISSILE SILOS
F.W. BAUMGARDNER, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235 (DF319400)

Emergency escape from a contaminated and/or oxygen deficient atmosphere in Titan missile silos necessitates the use of a self- contained breathing device by crewmembers and maintenance personnel. In order to provide biomedical criteria for breathing gas required during emergency egress via the silo ladder, extensive physiologic studies are necessary since no data applicable to these conditions are available. Respiratory requirements for rapid ascent on a vertical ladder are significantly higher than those encountered under normal exercise conditions. USAFSAM/VNT has been requested to develop physiologic specifications for a self-contained breathing device and to participate in man-testing and evaluation of the biomedical parameters of proposed devices. These efforts are coordinated with CINCSAC/DOS and Ogden ALC/MMC in accordance with requests from these organizations through the Titan weapons system safety group. Close technical liaison is also maintained with Warner-Robins ALC/MMU.

Human volunteer subjects will participate in physiologic studies to determine the oxygen uptake, carbon dioxide output, tidal volume, respiratory frequency and pulmonary ventilation required for vertical ladder climbing during rapid ascents. Additional biomedical criteria such as limits for breathing resistance, gas temperature, and gas purity will be established. Biomedical aspects of proposed breathing devices will be evaluated by USAFSAM in conjunction with proposal review by Warner-Robins ALC/MMU in the second quarter of FY 75. Baseline physiologic measurements during ladder climbing will be made at USAFSAM in the third quarter of FY 75, and man-testing and biomedical assessment of contractor breathing devices will be accomplished in the fourth quarter of FY 75. Subsequently USAFSAM observers will be present in a Titan silo during OT&E coordinated by the Titan Weapon System Safety Group. Additional tests will then be conducted by USAFSAM on breathing devices which will have been carried routinely by Titan system personnel.

Supporting agency address information: USAF School of Aerospace Medicine VN, Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, DEVELOPMENT OF A COMPUTER PROGRAM BASED ON THE EMPIRICAL PSEUDO-POTENTIAL METHOD
UNKNOWN, Univ. of California, Graduate School, *Davis, California* 95616 (NCA 2-80502; 506-16-12)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

7.0002, NEW TECHNIQUES FOR DATA ANALYSIS
UNKNOWN, Stanford University, Graduate School, *Palo Alto, California* 94305 (NCA 2-45519; 185-47-67)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

7.0003, SCIENTIFIC DATA REDUCTION AND ANALYSIS ACTIVITIES AIM EXPERIMENT S-054
G.S. VAIANA, Harvard University, Graduate School, *Cambridge, Massachusetts* 02138 (NAS 8-31374; 996-00-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

7.0004, STUDY IN THE AREA OF INTERNATIONAL NETWORKING ASPECTS AND IMPLICATIONS OF HIGH DATA RATES
UNKNOWN, Mass. Inst. of Technology, Graduate School, *Cambridge, Massachusetts* 02139 (NASW 2787; 644-01-02)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

7.0005, DEVELOP AND IMPLEMENT TECHNIQUES TO CALCULATE ROCKET ATTITUDE FROM ASPECT PROBE DATA
R.J. MARCOU, Boston College, School of Arts, *Chestnut Hill, Massachusetts* 02167 (DF244190; F19628-75-C-0045)

AF function - research rocket measurements of atmospheric parameters. Deficiency - techniques needed to analyze probe outputs and correlate them with instantaneous sensor pointing directions to calculate atmospheric parameters. How research contributes - enables researchers to reduce telemetry data transmitted from rocket-mounted sensors which require precise pointing information to conduct investigations and perform analysis necessary to calculate atmospheric parameters as a function of altitude and/or rocket position. Provides scientists with the ability to correlate perturbations with localized atmospheric conditions and also to correlate data from various experiments.

Supporting agency address information: AF Cambridge Research Laboratories SU, L. G. Hanscom AFB, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

7.0006, COMPUTER PROGRAM FOR FAST KARNUNEN LOEVE TRANSFORM ALGORITHM
UNKNOWN, State University of New York, Graduate School, *Albany, New York* 12203 (NAS 8-31434; 656-42-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

7.0007, TECHNICAL SERVICE OPERATIONS AND MATERIALS FOR CATALOGING BOOKS AND OTHER MATERIAL
T.D. FOUNTAIN, Columbia University, Graduate School, *New York, New York* 10027 (NAS 5-22311; 611-13-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

7.0008, SATELLITE ULTRAVIOLET DATA ANALYSIS PROGRAM
M.R. MOLNAR, Univ. of Toledo, Graduate School, *Toledo, Ohio* 43606 (NSG 7138; 385-41-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

7.0009, INVESTIGATION OF OPTIMAL DISCRETE APPROXIMATIONS FOR REAL-TIME FLIGHT SIMULATIONS
E.A. PARRISH, Univ. of Virginia, School of Engin. & Appl. Sci., *Charlottesville, Virginia* 22903 (NSG 1151; 504-09-41)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

7.0010, DEVELOPMENT OF NEW TECHNIQUES FOR THE MEASUREMENT OF SYSTEM EFFECTIVENESS
E.M. CONNELLY, Omnemii Incorporated, *Vienna, Virginia* 22180 (DF318750; F33615-75-C-5088)

Optimal control theory requires that a 'cost functional' be defined relative to some prescribed goal. In manned systems, this cost functional can be so that mission relevant (pilot perceived) variables other than energy costs are considered. Little information is available to guide designers in stipulating appropriate 'costs'. The objective here is to develop the analytic procedures for determining what cost functional weightings occur in specific cases of manned system performance. Availability of these procedures will permit better empirical study of manual control systems and provide data on pilot- derived weightings of mission costs to guide future design analyses.

Human subjects will 'fly' a simulated vehicle in a prescribed mission scenario. An optimal control model will be formulated and a performance index defined so that performance can be continuously evaluated based on 'cost-to-goal' and control policies can be defined that are optimal for any environment-induced perturbation in the flight plan.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, POPULATION INVERSION IN CHARGE EXCHANGE COLLISIONS
J.J. MATESE, Univ. of Southwestern La., School of Liberal Arts, *Lafayette, Louisiana* 70501 (NSG 3049; 502-10-03)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0002, INVESTIGATION OF THE EFFECTS OF A MOVING ACOUSTIC MEDIUM ON JET NOISE MEASUREMENTS
UNKNOWN, Tufts University, Graduate School, *Medford, Massachusetts* 02155 (NCA-2-85601; 760-61-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0003, RESEARCH OF WAVES AND FIELDS IN PLASMA
P.J. KELLOGG, Univ. of Minnesota, School of Liberal Arts, *Minneapolis, Minnesota* 55455 (NSG 7108; 188-36-55)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0004, MEASUREMENTS OF SEC TUBE ENERGETIC CHARGED PARTICLE INDUCED BACKGROUND
J.L. LOWRANCE, Princeton University, Graduate School, *Princeton, New Jersey* 08540 (NSG 5063; 893-78-56)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0005, THEORETICAL STUDIES IN MEDIUM- AND HIGH-ENERGY ATOMIC PHYSICS
V. FRANCO, City University of New York, School of Liberal Arts, *Brooklyn, New York* 11210 (NSG 1166; 506-90-21)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0006, INTERRELATIONSHIP OF PARTICLES DYNAMICS AND COLOR
UNKNOWN, Oregon State University, Graduate School, *Corvallis, Oregon* 97331 (NAS 5-22319; 161-03-02)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0007, HIGH-ENERGY, HIGH-WEIGHT CHARGED PARTICLES DOSIMETRY FOR THE APOLLO-SOYUZ PROJECT
L.S. PINSKY, Univ. of Houston, Graduate School, *Houston, Texas* 77004 (NAS 9-14652)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0008, MICROWAVE DIAGNOSTIC INSTRUMENTATION FOR STEADY STATE PLASMA
A.L. GARDNER, Brigham Young University, School of Physical Sciences, *Provo, Utah* 84601 (NSG 3088; 506-25-11)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0009, STUDY OF THEORY OF ACOUSTICAL PROPAGATION THROUGH A HIGH SUBSONIC MACH NUMBER DUCT CONSTRICTION
UNKNOWN, Virginia Polytechnic Institute, Graduate School, *Blacksburg, Virginia* 24061 (NAS 1-13884; 505-03-12)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

SOCIAL SCIENCES

Includes Social Sciences (general); Administration and Management; Documentation and Information Science; Economics and Cost Analysis; Law and Political Science; and Urban Technology and Transportation.

9.0001, LEGAL IMPLICATIONS OF EXTRATERRESTRIAL CIVILIZATIONS
UNKNOWN, Univ. of Santa Clara, Graduate School, *Santa Clara, California* 95053 (NCA 2-85510; 790-91-02)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

9.0002, HEAVY MODELLING OF AN URBANIZED ESTUARY
M.L. BOTTINO, New York University, Graduate School, *New York, New York* 10003 (NAS 5-20961; 176-52-41)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, SOLAR X-RAY AND INTERPLANETARY AND SOLAR ELECTRONS FOR THE ISEE-C SPACECRAFT
UNKNOWN, Univ. of California, Graduate School, *Berkeley, California* 94720 (NAS 5-22307; 862-12-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0002, MAP LUNAR SURFACE REMANENT MAGNETIC FIELDS AND TO DEVELOP THE THEORY OF SOLAR WINDS CAVITY
UNKNOWN, Univ. of California, Graduate School, *Berkeley, California* 94720 (NSG 7127; 383-20-03)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0003, RELATIONSHIP OF IMPACT CRATERING TO THE EVOLUTION OF THE LUNAR SURFACE
T.J. AHRENS, Calif. Inst. of Technology, Graduate School, *Pasadena, California* 91109 (NSG 7129; 383-20-03)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0004, ARTIFICIAL METEOR ABLATION PRODUCTS
M.E. MADDOCK, Calif. State Univ. & Colleges, Graduate School, *San Jose, California* 95114 (NCA 2-75414; 195-21-04)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0005, STUDY OF THE SOLAR CORONA USING RADIO OBSERVATIONS AND SKYLAB OBSERVATIONS
G.A. DULK, Univ. of Colorado, School of Arts & Sciences, *Boulder, Colorado* 80302 (NAS 8-31378; 385-38-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0006, STUDIES OF X-RAY ULTRAVIOLET AND OPTICAL EMISSION FROM GALACTIC X-RAY SOURCES
R. MCCRAY, Univ. of Colorado, School of Arts & Sciences, *Boulder, Colorado* 80302 (NSG 7128; 188-46-59)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0007, RESEARCH OF SOLAR HARD X-RAYS AND GAMMA-RAYS
C. WERNTZ, Catholic University of America, School of Arts & Sciences, *Washington, District of Columbia* 20017 (NSG 5066; 188-38-53)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0008, CONTRACTION AND ACCRETION MODELS OF JUPITER AND SATURN
A.S. GROSSMAN, Iowa State University, School of Human. & Sciences, *Ames, Iowa* 50010 (NCA 2-40405; 384-47-66)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0009, SIMULATION OF THE EOLIAN MODIFICATION OF MARTIAN CRATERS
UNKNOWN, Iowa State University, Graduate School, *Ames, Iowa* 50010 (NCA 2-40601; 185-50-60)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0010, SOLAR X-RAY ASTRONOMY ROCKET PROGRAM
G.S. VAIANA, Harvard University, Graduate School, *Cambridge, Massachusetts* 02138 (NSG 2081; 879-11-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0011, VIKING/LANDER IMAGING STUDIES
UNKNOWN, Washington University, Graduate School, *St. Louis, Missouri* 63130 (NAS 1-13889; 815-20-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0012, SOLAR GAMMA RAY EXPERIMENT
E.L. CHUPP, Univ. of New Hampshire, School of Liberal Arts, *Durham, New Hampshire* 03824 (NAS 5-22342; 826-12-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0013, SPECTROSCOPY USING THE ONE METER ULTRAVIOLET OPTICAL TELESCOPE FOR SPACELAB ASTRONOMY MISSIONS
UNKNOWN, Princeton University, Graduate School, *Princeton, New Jersey* 08540 (NAS 5-22360; 356-41-01)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0014, SOLAR MAXIMUM MEASUREMENT EXPERIMENT
R. NOVICK, Columbia University, Graduate School, *New York, New York* 10027 (NAS 5-22341; 826-12-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0015, APOLLO PASSIVE SEISMIC EXPERIMENT
G.V. LATHAM, Univ. of Texas, Graduate School, *Austin, Texas* 78712 (NAS 9-14581; 383-31-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

GENERAL

11.0001, OSO-I GUEST INVESTIGATOR PROGRAM
E.C. BRUNER, Univ. of Colorado, Graduate School, *Boulder, Colorado* 80302 (NSG 7130; 385-38-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

11.0002, EFFICIENT RESEARCH AND TECHNOLOGY PROGRAM FORMULATION UNDER CONDITIONS OF RISK AND UNCERTAINTY
D. GRAHAM, Princeton University, School of Engin. & Appl. Sci., *Princeton, New Jersey* 08540 (NSG 7131; 791-40-10)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

11.0003, THE CONDUCT OF A FIVE-DAY SYMPOSIUM ON AERONAUTICS AND SPACE
UNKNOWN, Shaw University, Graduate School, *Raleigh, North Carolina* 27602 (NASW 2793; 010-00-00)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

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Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N75-26967*+ National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A SPECIAL BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 55
Mar. 1975 86 p refs
(NASA-SP-7037(55)) Avail: NTIS HC $4.00 CSCL 01A

This bibliography lists 260 reports, articles, and other documents introduced into the NASA scientific and technical information system in February 1975. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N75-26968*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF INLET INGESTION OF A WING TIP VORTEX ON COMPRESSOR FACE FLOW AND TURBOJET STALL MARGIN
Glenn A. Mitchell Washington Jul. 1975 78 p refs
(NASA-TM-X-3246; E-8213) Avail: NTIS HC $4.75 CSCL 01A

A two-dimensional inlet was alternately mated to a coldpipe plug assembly and a J85-GE-13 turbojet engine, and placed in a Mach 0.4 stream so as to ingest the tip vortex of a forward mounted wing. Vortex properties were measured just forward of the inlet and at the compressor face. Results show that ingestion of a wing tip vortex by a turbojet engine can cause a large reduction in engine stall margin. The loss in stall compressor pressure ratio was primarily dependent on vortex location and rotational direction and not on total-pressure distortion. Author

N75-26969# Aeronautical Research Labs., Melbourne (Australia).
EXPERIMENTAL STUDIES OF THE WAKE BEHIND LONG, YAWED CONE-CYLINDERS AT MACH 7.5
A. S. Kaye and M. J. Williams Sep. 1974 51 p refs
(ARL/A-Note-353) Avail: NTIS HC $4.25

An experimental study was made of the wake behind long yawed cone cylinders with nose semi-angles from 5 to 45 degrees at incidences up to 14 degrees. Testing was done in a Mach 7.5 airstream for both subsaturated and condensing flow conditions, the latter enabling the use of vapor screen flow visualization methods. The main features of the wake revealed by this method

N75-26970*# Wichita State Univ., Kans.
EXPERIMENTAL STUDIES OF FLOW SEPARATION AND STALLING ON A TWO-DIMENSIONAL AIRFOIL AT LOW SPEEDS
H. C. Seetharam and W. H. Wentz, Jr. Washington NASA Jul. 1975 64 p refs
(Grant NGR-17-003-021)
(NASA-CR-2560) Avail: NTIS HC $4.25 CSCL 01A

Detailed measurements of flow fields associated with low-speed turbulent boundary layers were made for the 17% thick GA(W)-1 airfoil section at nominal angles of attack of 10 deg, 14 deg, and 18 deg, Reynolds number 2.2 x 10, and Mach number 0.13. The data include pressure and velocity surveys of the pre- and post-separated regions on the airfoil and the associated wake. The boundary layer characteristics including regions of separation on the airfoil are also presented. Author

N75-26971*# Auburn Univ., Ala. Dept. of Aerospace Engineering.
ANALYSIS AND COMPILATION OF MISSILE AERODYNAMIC DATA Interim Report
James O. Nichols 31 Dec. 1974 111 p refs
(Grant NsG-1002)
(NASA-CR-143145) Avail: NTIS HC $5.25 CSCL 16D

Missile aerodynamic data which have been declassified are presented. Only summary data are given, but a list of reference documents provides sources of detailed data. Most of the configurations considered are suitable for highly maneuverable air-to-air or surface-to-air missiles; however, a few cruise missile and projectile configurations are also provided. The Mach number range of the data is generally from about 1.5 to 4.63; however, data for some configurations extend to subsonic Mach numbers. The following longitudinal aerodynamic characteristics at various Mach numbers are presented: (1) pitch control effectiveness, (2) drag coefficient at zero lift, (3) lift-curve slope at alpha = 0 deg, and (4) aerodynamic-center location. Author

N75-26972*# Old Dominion Univ., Norfolk, Va. School of Engineering.
THE FINITE ELEMENT METHOD IN LOW SPEED AERODYNAMICS Final Technical Report
A. J. Baker and P. D. Manhardt (Textron Bell Aerospace) May 1975 73 p refs
(Grant NsG-1038)
(NASA-CR-143190; TR-75-T5) Avail: NTIS HC $4.25 CSCL 01A

The finite element procedure is shown to be of significant impact in design of the 'computational wind tunnel' for low speed aerodynamics. The uniformity of the mathematical differential equation description, for viscous and/or inviscid, multi-dimensional subsonic flows about practical aerodynamic system configurations, is utilized to establish the general form of the finite element algorithm. Numerical results for inviscid flow analysis, as well as viscous boundary layer, parabolic, and full Navier Stokes flow descriptions verify the capabilities and overall versatility of the fundamental algorithm for aerodynamics. The proven mathematical basis, coupled with the distinct user-orientation features of the computer program embodiment, indicate near-term evolution of a highly useful analytical design tool to support computational configuration studies in low speed aerodynamics. Author

N75-26973*# Bell Helicopter Co., Fort Worth, Tex.
DIGITAL COMPUTER PROGRAM DF1758 FULLY COUPLED NATURAL FREQUENCIES AND MODE SHAPES OF A HELICOPTER ROTOR BLADE
R. L. Bennett 6 Mar. 1975 120 p
(Contract NAS1-13722)
(NASA-CR-132662; Rept-299-099-724) Avail: NTIS HC $5.25 CSCL 01C

The analytical techniques and computer program developed in the fully-coupled rotor vibration study are described. The rotor blade natural frequency and mode shape analysis was implemented in a digital computer program designated DF1758. The program computes collective, cyclic, and scissor modes for a single blade within a specified range of frequency for specified values of rotor RPM and collective angle. The analysis includes effects of blade twist, cg offset from reference axis, and shear center offset from reference axis. Coupled inplane, out-of-plane, and torsional vibrations are considered. Normalized displacements, shear forces and moments may be printed out and Calcomp plots of natural frequencies as a function of rotor RPM may be produced. Author

N75-26974# Lockheed Missiles and Space Co., Palo Alto, Calif.
METHOD OF COMPUTING POTENTIAL INCOMPRESSIBLE FLUID FLOW AROUND A BODY OF REVOLUTION
V. V. Voinov, O. V. Voinov, and A. G. Petrov 1974 7 p refs Transl. into ENGLISH from Zh. Vychisl. Matem. i Matem. Fiz. (USSR), v. 14, no. 3, 1974 p 797-802
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Illinois 60-616

The problem of potential, longitudinal, incompressible fluid flow around a body of revolution is considered. A Fredholm integral equation of the second kind is formed for the potential on the body contour and a method of solution is proposed. The results of computing the potential and the apparent masses are compared with the exact solutions. Author

N75-26975*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DETAILED TRANSONIC FLOW FIELD MEASUREMENTS ABOUT A SUPERCRITICAL AIRFOIL SECTION
Francis X. Hurley, Frank W. Spaid, Frederick W. Roos, Louis S. Stivers, Jr., and Angelo Bandettini Washington Jul. 1975 64 p refs
(NASA-TM-X-3244; A-5869) Avail: NTIS HC $4.25 CSCL 01A

The transonic flow field about a Whitcomb-type supercritical airfoil profile was measured in detail. In addition to the usual surface pressure distributions and wake surveys, schlieren photographs were taken and velocity vector profiles were determined in the upper surface boundary layer and in the near wake. Spanwise variations in the measured pressures were also determined. The data are analyzed with the aid of an inviscid transonic finite-difference computer program as well as with boundary layer modeling and calculation schemes. Author

N75-26976*# Boeing Commercial Airplane Co., Seattle, Wash.
COMPARISON OF WIND TUNNEL TEST RESULTS AT FREE STREAM MACH 0.7 WITH RESULTS FROM THE BOEING TEA-230 SUBSONIC FLOW METHOD Final Report
L. W. Mohn Washington NASA Jul. 1975 91 p refs
(Contract NAS1-12214)
(NASA-CR-2554; D6-41780) Avail: NTIS HC $4.75 CSCL 01A

The use of the Boeing TEA-230 Subsonic Flow Analysis method as a primary design tool in the development of cruise overwing nacelle configurations is presented. Surface pressure characteristics at 0.7 Mach number were determined by the TEA-230 method for a selected overwing flow-through nacelle configuration. Results of this analysis show excellent overall agreement with corresponding wind tunnel data. Effects of the presence of the nacelle on the wing pressure field were predicted accurately by the theoretical method. Evidence is provided that differences between theoretical and experimental pressure distributions in the present study would not result in significant discrepancies in the nacelle lines or nacelle drag estimates. Author

N75-26977*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
PROBLEMS OF FLIGHT IN TURBULENCE
Gabriel Coupry Washington May 1975 35 p refs Transl. into ENGLISH from Intern. Council of the Aeron. Sci., Congr., 9th (Haifa, Israel), 25-30 Aug. 1974 15 p
(NASA-TT-F-16401) Avail: NTIS HC $3.75 CSCL 01A

A description of mathematical models which can provide the aircraft designer with a practical representation of the flight environment encountered by an aircraft, and classical models with new approaches, both British and French, is presented. It is shown by calculation of the response of a flexible aircraft to turbulence, that, as a rule, the turbulence field should be considered as isotropic. It is also shown how active control systems open the way to a next generation of aircraft that will be less sensitive to gusts. Systems at present under test are described. Author

N75-26978# Nielsen Engineering and Research, Inc., Mountain View, Calif.
SUPERSONIC LIFTING-SURFACE COMPUTER PROGRAM FOR CRUCIFORM WING-BODY COMBINATIONS Technical Report, 1 Oct. 1973 - 30 Sep. 1974
Marnix F. E. Dillenius and Jack N. Nielsen Dec. 1974 138 p refs
(Contract N00014-74-C-0050; NR Proj. 215-226)
(AD-A003925; NEAR-TR-74) Avail: NTIS CSCL 16/2

A lifting-surface computer program has been written for supersonic cruciform wing-body combinations at combined pitch and yaw conditions. The method involves supersonic line sources and doublets to model the body and uses Woodward's constant pressure panels to represent the wing. Such panels are also placed on the body surface to account for wing-body interference. GRA

N75-26979# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
POTENTIAL FLOW ABOUT THREE DIMENSIONAL STREAMLINED LIFTING CONFIGURATIONS, WITH APPLICATION TO WINGS AND ROTORS Interim Report
J. Michael Summa Sep. 1974 160 p refs
(Contract F44620-73-C-0036; AF Proj. 9781; AF Proj. 6813)
(AD-A003697; SU-DAAR-485; AFOSR-74-1914TR) Avail: NTIS CSCL 01/1

A numerical method is developed and successfully applied which is believed capable of converging to the exact calculation of three-dimensional lifting potential flows, including cases of unsteady motion. The principal current limitation on its precision is restricted funds for computation. The exact body surface boundary conditions are enforced, and all wake surfaces are unconstrained -- allowed to move with the local velocity field. The assumptions made in the theoretical model are that the fluid is ideal (incompressible and inviscid) and that no separation may take place. GRA

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N75-26980*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EXPLORATORY FLIGHT INVESTIGATION OF AIRCRAFT RESPONSE TO THE WING VORTEX WAKE GENERATED BY THE AUGMENTOR WING JET STOL RESEARCH AIRCRAFT

Robert A. Jacobsen and Fred J. Drinkwater, III May 1975 19 p refs

(NASA-TM-X-62387; A-5753) Avail: NTIS HC $3.25 CSCL 01C

A brief exploratory flight program was conducted at Ames Research Center to investigate the vortex wake hazard of a powered-lift STOL aircraft. The study was made by flying an instrumented Cessna 210 aircraft into the wake of the augmentator wing jet STOL research aircraft at separation distances from 1 to 4 n.mi. Characteristics of the wake were evaluated in terms of the magnitude of the upset of the probing aircraft. Results indicated that within 1 n.mi. separation the wake could cause rolling moments in excess of roll control power and yawing moments equivalent to rudder control power of the probe aircraft. Subjective evaluations by the pilots of the Cessna 210 aircraft, supported by response measurements, indicated that the upset caused by the wake of the STOL aircraft was comparable to that of a DC-9 in the landing configuration. Author

N75-26981# Naval Postgraduate School, Monterey, Calif.

A PROPOSAL TO IMPLEMENT STATISTICAL RELIABILITY ANALYSIS METHODOLOGY INTO THE NAVAL AVIATION MAINTENANCE PROGRAM M.S. Thesis

Thomas Preston Driver and Herbert John Kressel Dec. 1974 57 p refs

(AD-A004264) Avail: NTIS CSCL 15/5

The thesis investigates the decision logic utilized in the existing and planned aircraft maintenance programs of the United States Navy. The authors' basic belief in the profit motive as an incentive for efficiency led to additional research into the decision logic employed by the commercial air carriers. The conclusions reflect the contention that a statistical reliability based maintenance program would increase the efficiency of resource allocation and aircraft reliability. Recommendations are proposed which would aid in the implementation of such a system. GRA

N75-26982# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.

AIRCRAFT ACCIDENT REPORT: AIR EAST, INC. BEECHCRAFT 99A, N125AE, JOHNSTOWN-CAMBRIA COUNTY AIRPORT, JOHNSTOWN, PENNSYLVANIA, 6 JANUARY 1974

15 Jan. 1975 32 p

(PB-239891/5; NTSB-AAR-75-3) Avail: NTIS HC $3.75 CSCL 01B

Beechcraft 99A crashed while making an instrument approach to runway 33 at the Johnstown-Cambria County Airport, Johnstown, Pennsylvania. Of the 15 passengers and 2 crewmembers aboard, 11 passengers and the captain were killed in the crash. The four remaining passengers and the first officer were seriously injured. The aircraft was destroyed. While on an instrument landing system localizer approach, the aircraft struck approach lights about 300 feet from the runway threshold and then crashed into an embankment about 200 feet from the threshold. Shortly before and shortly after the accident, the reported weather conditions at the Johnstown Airport consisted in part of variable 200- to 400-foot ceilings and a prevailing visibility of 2 miles in very light snow and fog. The National Transportation Safety Board determines that the probable cause of this accident was a premature descent below a safe approach slope followed by a stall and loss of aircraft control. GRA

N75-26983# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.

AIRCRAFT ACCIDENT REPORT. BRIEF FORMAT, U.S. CIVIL AVIATION ISSUE NUMBER 3 OF 1974 ACCIDENTS. FILE NUMBERS: 1-0002 THRU 1-0007, 1-0009 THRU 1-0019, 1-0021 THRU 1-0023, 1-0025 THRU 1-0028, 3-1034, 3-1444, 3-1801 THRU 3-2700

3 Jan. 1975 547 p

(PB-240364/0; NTSB-BA-74-7) Avail: NTIS HC $12.50 CSCL 01B

Selected aircraft accident reports are presented in brief format, occurring in U.S. Civil Aviation operations during calendar year 1974. The brief format presents the facts, conditions, circumstances, and probable cause(s) for each accident. Additional statistical information is tabulated by type of accident, phase of operation, kind of flying, injury index, aircraft damage, conditions of light, pilot certificate, injuries, and casual factors. GRA

N75-26984# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.

AIRCRAFT ACCIDENT REPORT: NEW JERSEY AIR NATIONAL GUARD F106, SERIAL NUMBER 59-0044, PIPER PA-24-250, N6876P, MIDAIR COLLISION NEAR SAXIS, VIRGINIA, 11 OCTOBER 1974 Aircraft Accident Report

29 Jan. 1975 18 p

(PB-240250/1; NTSB-AAR-75-6) Avail: NTIS HC $3.25 CSCL 01B

About 2023 eastern daylight time on October 11, 1974, a New Jersey Air National Guard F106 and a Piper PA 24-250, N6876P, collided in midair near Saxis, Virginia. The National Transportation Safety Board determines that the probable cause of the accident was the failure of the interceptor pilot to see and avoid a civil aircraft during a high-speed, low-altitude, intercept training flight conducted in an area which included major north-south airways. Also contributing to this accident was the system which permitted an incompatible mix of traffic in controlled airspace which resulted in the probability of an inadvertent radar lock-on to a civil aircraft. GRA

N75-26985# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.

AIRCRAFT ACCIDENT REPORT: AIRCRAFT POOL LEASING CORPORATION, LOCKHEED SUPER CONSTELLATION, L-1049H, N6917C, MIAMI, FLORIDA, 15 DECEMBER 1973

11 Sep. 1974 32 p

(PB-240120/6; NTSB-AAR-74-11) Avail: NTIS HC $3.75 CSCL 01B

At 2353 e.s.t. on December 15, 1973, an Aircraft Pool Leasing Corporation's Lockheed Super Constellation L-1049H, which was operating as a cargo carrier, crashed after takeoff from runway 9L of the Miami International Airport, Miami, Florida. The probable cause of this accident was determined to be overrotation of the aircraft at lift-off resulting in flight in the aerodynamic region of reversed command, near the stall regime, and at too low an altitude to effect recovery. The reason for the aircraft's entering this adverse flight condition could not be determined. Factors which may have contributed to the accident include: (a) improper cargo loading, (b) a rearward movement of unsecured cargo resulting in a center of gravity shift aft of the allowable limit, and (c) deficient crew coordination. GRA

N75-26986# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.

AIRCRAFT ACCIDENT REPORT: SATURN AIRWAYS INC., LOCKHEED L-382, N14ST, SPRINGFIELD, ILLINOIS, 23 MAY 1974

22 Jan. 1975 37 p

(PB-240119/8; NTSB-AAR-75-5) Avail: NTIS HC $3.75 CSCL 01B

About 1653 c.d.t., May 23, 1974, Saturn Airways Flight 14 crashed about 2.6 miles southeast of the Capital VOR, near Springfield, Illinois. The outboard section of the left wing, including the No. 1 engine, separated in flight from the remainder of the wing. The National Transportation Safety Board determines that the probable cause of the accident was the undiscovered, preexisting fatigue cracks, which reduced the strength of the

left wing to the degree that it failed as a result of positive aerodynamic loads created by moderate turbulence. GRA

N75-26987# Texas Univ., Austin. Bureau of Business Research.
INVENTORY OF FREIGHT TRANSPORTATION IN THE SOUTHWEST. PART 3: AIR FREIGHT SERVICE IN THE DALLAS-FORT WORTH AREA
J. Bryan Adair Jun. 1974 83 p refs
(Contract DOT-OS-30093)
(PB-239820/4; DOT-TST-75/31: RR-6) Avail: NTIS HC $4.75 CSCL 01B

An inventory is provided of existing air freight transportation facilities, services, and practices in the twenty-four Texas and two Oklahoma counties surrounding and including Dallas and Fort Worth. Included in the inventory are details on air tonnages handled, volume trends, an analysis of domestic and foreign air commerce ties, information on airports, freight handling facilities, airlines, air freight forwarded, and commmuter air carriers serving the area. Products and commodities commmonly shipped to and from the Dallas-Fort Worth region by air are listed. Actual and potential problem areas are considered for their possible influence on the air freight industry. GRA

N75-26988# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.
ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA, US GENERAL AVIATION, CALENDAR YEAR 1972
14 Nov. 1974 207 p
(PB-239608/3; NTSB-ARG-74-3) Avail: NTIS HC $7.25 CSCL 01B

The Annual Review of Aircraft Accident Data is a statistical compilation from reports of 4,256 general aviation accidents that occurred during calendar year 1972. Also included are 44 collisions between aircraft. By coding each aircraft involved in the collisions, an additional 44 records are produced, bringing total accidents records to 4,300. GRA

N75-26989# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.
AIRCRAFT ACCIDENT REPORT: NATIONAL AIRLINES, INCORPORATED, DC-10-10, N60NA, NEAR ALBUQUERQUE, NEW MEXICO, 3 NOVEMBER 1973
15 Jan. 1975 59 p
(PB-239889/9; NTSB-AAR-75-2) Avail: NTIS HC $4.25 CSCL 01B

On November 3, 1973, at about 1640 MST, National Airlines, Inc., Flight 27, was cruising at 39,000 feet, 65 nmi southwest of Albuquerque, New Mexico, when the No. 3 engine fan assembly disintegrated. Fragments of the fan penetrated the fuselage, the Nos. 1 and 2 engine nacelles, and the right wing. As a result, the cabin depressurized and one cabin window, which was struck by a fragment of the fan assembly, separated from the fuselage. A passenger, who was sitting next to the window, was forced through the opening and ejected from the aircraft. The body of the passenger has not been recovered. The aircraft was landed safely at Albuquerque International Airport. The National Transportation Safety Board determines that the probable cause of this accident was the disintegration of the No. 3 engine fan assembly as a result of an interaction between the fan blade tips and the fan case. GRA

N75-26990# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.
AIRCRAFT ACCIDENT REPORT: IBERIA LINEAS AEREAS DE ESPANA (IBERIAN AIRLINES). MCDONNELL DOUGLAS DC-10-30, EC CBN LOGAN INTERNATIONAL AIRPORT, BOSTON, MASSACHUSETTS, 17 DECEMBER 1973
8 Nov. 1974 33 p
(PB-239890/7; NTSB-AAR-74-14) Avail: NTIS HC $3.75 CSCL 01B

About 1543 EST on December 17, 1973, Iberia Lineas Aereas de Espana Flight 933, a DC-10-30, crashed while making an instrument landing system approach to runway 33 L at Logan International Airport, Boston, Massachusetts. Thirteen passengers were injured slightly; two passengers and one flight attendant were injured seriously during evacuation. The aircraft was substantially damaged. The National Transportation Safety Board determines that the probable cause of this accident was that the captain did not recognize, and may have been unable to recognize, an increased rate of descent in time to arrest it before the aircraft struck the approach light piers. The captain's ability to detect and arrest the increased rate of descent was adversely affected by a lack of information as to the existence of the wind shear and the marginal visual cues available. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications*.

N75-26991# Douglas Aircraft Co., Inc., Long Beach, Calif.
FEASIBILITY OF REAL TIME SIMULATION OF AIRPORT/AIRSIDE OPERATIONS
James B. ONeill and R. T. White Mar. 1975 42 p
(Contract DOT-FA72WA-2897)
(AD-A006996; FAA-RD-75-18) Avail: NTIS HC $3.75 CSCL 17/7

All aspects of an airport airside are examined as are aspects of controller functions. A possible real time simulator is defined for simulating the tower cab under conditions of zero visibility. This system is composed of cathode ray tubes and driven by minicomputers to give a low cost portable system. The number of displays required and the computer load for these systems are defined. Application of the proposed system to several typical problems is discussed. A detailed analysis of the engineering requirement and the human factors analysis of real time simulation are included. Author

N75-26992# Martin Marietta Aerospace, Denver, Colo.
SPACE SEXTANT HIGH ALTITUDE NAVIGATION SYSTEM (SS-HANS) STUDY. VOLUME 3. PRIME ITEM DEVELOPMENT SPECIFICATION Report for 17 Jun. 1974 - 1 Feb. 1975
A. Dale Mikelson and R. G. Brown Mar. 1975 60 p refs
(Contract F04701-74-C-0566)
(AD-A008102/6; MCR-75-5-Vol-3; SAMSO-TR-75-73-Vol-3) Avail: NTIS CSCL 17/7

This specification establishes the performance, design, and development requirements for a Space Sextant-High Altitude Navigation System. GRA

N75-26993# Mitre Corp., Bedford, Mass.
CALIBRATION OF RELATIVE POSITION ERRORS OF THE RANGE CAPABLE DATA LINK AND LORAN-C
E. A. Westbrook Jan. 1975 36 p
(Contract F19628-73-C-0001; AF Proj. 7200)
(AD-A004777; MTR-2798; ESD-TR-74-311) Avail: NTIS CSCL 17/7

The results of the preliminary calibration tests of the testbed system and Loran-C equipment to be used in the flight tests of the Electronic Grid Integration Program are reported. These ground and airborne tests were conducted to obtain data on basic system characteristics of Loran-C and the TDMA data link ground system needed for the construction of a realistic simulation to be used in testing the Kalman filter navigation algorithm under development for a combination data link/navigation program and for use in performance analysis of the live flight tests of that program. GRA

N75-27185* Coast Guard, Washington, D.C. OMEGA Navigation System Operations Detail.
OMEGA NAVIGATION SYSTEM STATUS AND FUTURE PLANS
Thomas P. Nolan and David C. Scull *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 165-186 (For availability see N75-27173 18-31)
CSCL 17G

N75-27186* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RECENT FIELD TEST RESULTS USING OMEGA TRANSMISSIONS FOR CLOCK SYNCHRONIZATION
A. R. Chi and S. C. Wardrip *In its* Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 187-197 refs (For availability see N75-27173 18-31)
CSCL 17G

N75-27189* Institute for Telecommunication Sciences, Boulder, Colo.
A GENERAL DESCRIPTION OF LORAN-C: PRESENT AND POTENTIAL APPLICATIONS
Robert H. Doherty *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 223-247 refs (For availability see N75-27173 18-31)
CSCL 17G

N75-27190* Naval Observatory, Washington, D.C.
DESIGN AND OPERATION OF A LORAN-C TIME REFERENCE STATION
Kenneth Putkovich *In* NASA. Goddard Space Flight Center Proc. of the Sixth. Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 249-262 refs (For availability see N75-27173 18-31)
CSCL 17G

N75-27191* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PERFORMANCE OF LORAN-C CHAINS RELATIVE TO UTC
A. R. Chi *In* Its Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 263-303 refs (For availability see N75-27173 18-31)
CSCL 17G

N75-27192* Coast Guard, Washington, D.C.
LORAN-C EXPANSION: IMPACT ON PRECISE TIME/TIME INTERVAL
John F. Roeber, Jr. *In* NASA. Goddard Space Flight Center Proc. of the Sixth. Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 305-318 (For availability see N75-27173 18-31)
CSCL 17G

N75-27193* Army Electronics Command, Fort Monmouth, N.J. Communications/Automatic Data Processing Lab.
GROUND EFFECTS ON LORAN-C SIGNALS
D. C. Pearce and J. W. Walker *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 319-343 refs (For availability see N75-27173 18-31)
CSCL 17G

N75-27202* Space and Missile Systems Organization, Los Angeles Air Force Station, Calif.
NAVSTAR: GLOBAL POSITIONING SYSTEM AN EVOLUTIONARY RESEARCH AND DEVELOPMENT PROGRAM
B. W. Parkinson *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 465-498 (For availability see N75-27173 18-31)
CSCL 17G

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

N75-26994# Boeing Aerospace Co., Seattle, Wash.
B-1 UNIQUE SIGNAL TRAIN GENERATION APPLICATION STUDY Final Report, 1 May - 30 Jun. 1974
A. R. Mandell, E. M. Costello, and D. E. Hightower Nov. 1974 85 p
(Contract F33657-72-C-0600; AF Proj. 2007)
(AD-A003682; D229-10363-1; AFWL-TR-74-297) Avail: NTIS CSCL 01/3

The background requirement which underlies this study is consideration by the U.S. Atomic Energy Commission of the incorporation of a device in aircraft-delivered nuclear weapons which would be an additional series safety device in the weapon pre-arm circuits. This device would be operated by a pulsating direct current signal whose format and implementation would be so unique that the possibility of its generation and application to the weapon by any means other than deliberate personnel action would be insignificantly small. GRA

N75-26995*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COMPARISON OF TWO HEAD-UP DISPLAYS IN SIMULATED STANDARD AND NOISE ABATEMENT NIGHT VISUAL APPROACHES
Fred Cronn (San Jose State Univ.) and Everett Palmer Washington Jul. 1975 23 p refs
(Grant NGL-05-046-002)
(NASA-TM-X-3264; A-5993) Avail: NTIS HC $3.25 CSCL 01D

Situation and command head-up displays were evaluated for both standard and two segment noise abatement night visual approaches in a fixed base simulation of a DC-8 transport aircraft. The situation display provided glide slope and pitch attitude information. The command display provided glide slope information and flight path commands to capture a 3 deg glide slope. Landing approaches were flown in both zero wind and wind shear conditions. For both standard and noise abatement approaches, the situation display provided greater glidepath accuracy in the initial phase of the landing approaches, whereas the command display was more effective in the final approach phase. Glidepath accuracy was greater for the standard approaches than for the noise abatement approaches in all phases of the landing approach. Most of the pilots preferred the command display and the standard approach. Substantial agreement was found between each pilot's judgment of his performance and his actual performance. Author

N75-26996*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THREE METHODS OF PRESENTING FLIGHT VECTOR INFORMATION IN A HEAD-UP DISPLAY DURING SIMULATED STOL APPROACHES
James H. Dwyer, III and Everett A. Palmer, III Washington Jul. 1975 16 p refs
(NASA-TM-X-3273; A-5992) Avail: NTIS HC $3.25 CSCL 01D

A simulator study was conducted to determine the usefulness of adding flight path vector symbology to a head-up display designed to improve glide-slope tracking performance during steep 7.5 deg visual approaches in STOL aircraft. All displays included a fixed attitude symbol, a pitch- and roll-stabilized horizon bar, and a glide-slope reference bar parallel to and 7.5 deg below the horizon bar. The displays differed with respect to the flight-path marker (FPM) symbol: display 1 had no FPM symbol; display 2 had an air-referenced FPM, and display 3 had a ground-referenced FPM. No differences between displays 1 and 2 were found on any of the performance measures. Display 3 was found to decrease height error in the early part of the approach and to reduce descent rate variation over the entire approach. Two measures of workload did not indicate any differences between the displays. Author

N75-26997*# McDonnell Aircraft Co., St. Louis, Mo.
A FUSELAGE/TANK STRUCTURE STUDY FOR ACTIVELY COOLED HYPERSONIC CRUISE VEHICLES: AIRCRAFT DESIGN EVALUATION
T. Nobe [1975] 116 p refs
(Contract NAS1-12995)
(NASA-CR-132668) Avail: NTIS HC $5.25 CSCL 01C

The effects of fuselage cross sections and structural members on the performance of hypersonic cruise aircraft are evaluated. Representative fuselage/tank area structure was analyzed for

strength, stability, fatigue and fracture mechanics. Various thermodynamic and structural tradeoffs were conducted to refine the conceptual designs with the primary objective of minimizing weight and maximizing aircraft range. M.C.F.

N75-26998*# McDonnell Aircraft Co., St. Louis, Mo.
A FUSELAGE/TANK STRUCTURE STUDY FOR ACTIVELY COOLED HYPERSONIC CRUISE VEHICLES: ACTIVE COOLING SYSTEM ANALYSIS
James E. Stone [1975] 104 p refs
(Contract NAS1-12995)
(NASA-CR-132669) Avail: NTIS HC $5.25 CSCL 01C

The effects of fuselage cross section and structural arrangement on the performance of actively cooled hypersonic cruise vehicles are investigated. An active cooling system which maintains the aircraft's entire surface area at temperatures below 394 K at Mach 6 is developed along with a hydrogen fuel tankage thermal protection system. Thermodynamic characteristics of the actively cooled thermal protection systems established are summarized. Design heat loads and coolant flowrate requirements are defined for each major structural section and for the total system. Cooling system weights are summarized at the major component level. Conclusions and recommendations are included. J.M.S.

N75-26999*# McDonnell Aircraft Co., St. Louis, Mo.
A FUSELAGE/TANK STRUCTURE STUDY FOR ACTIVELY COOLED HYPERSONIC CRUISE VEHICLES: STRUCTURAL ANALYSIS Technical Report, 11 Mar. 1974 - 30 Jun. 1975
Allen H. Baker [1975] 65 p refs
(Contract NAS1-12995)
(NASA-CR-132670) Avail: NTIS HC $4.25 CSCL 01C

The effects of fuselage cross-section (circular and elliptical) and structural arrangement (integral and nonintegral tanks) on the performance of actively cooled hypersonic cruise vehicles was evaluated. It was found that integrally machined stiffening of the tank walls, while providing the most weight-efficient use of materials, results in higher production costs. Fatigue and fracture mechanics appeared to have little effect on the weight of the three study aircraft. The need for thermal strain relief through insulation is discussed. Aircraft size and magnitude of the internal pressure are seen to be significant factors in tank design. Author

N75-27000*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EFFECTS OF INLET TREATMENT LOCATION AND TREATMENT CAVITY DEPTH ON COMPRESSOR NOISE
Lorenzo R. Clark Jun. 1975 42 p refs
(NASA-TM-X-72698) Avail: NTIS HC $3.75 CSCL 01C

The ability of acoustic liners to reduce compressor noise inside and in front of an inlet was studied. An axial flow research compressor and a specially designed inlet were used inside an anechoic chamber. Acoustic and performance data were obtained for a range of inlet treatment locations and cavity depths to determine their effects on inlet noise over a range of blade passing frequencies. The greatest noise reductions in front of the inlet were obtained with acoustic treatment located close to the compressor and backed with the deepest cavities tested. Inside the inlet the maximum noisa level reductions were obtained in the area of the treatment regardless of treatment location. No appreciable losses in compressor performance were measured. Author

N75-27001*# Virginia Univ., Charlottesville. School of Engineering and Applied Science.
THE EFFECTS OF AIRCRAFT DESIGN ON STOL RIDE QUALITY
Craig R. Jones and Ira D. Jacobson May 1975 103 p refs
(Grant NGR-47-005-208)
(NASA-CR-143113; ESS-4035-103-75) Avail: NTIS HC $5.25 CSCL 01C

Effects of aircraft dynamic characteristics on passenger ride quality are investigated to determine ride-quality isocontours similar to aircraft handling-qualities contours. Measurements are made on a moving-base simulator while varying the aircraft short-period and Dutch Roll frequencies and dampings. Both pilot ratings and subjective ride-quality ratings are obtained during flight. Ride and handling qualities were found to be complementary for the Dutch Roll mode, but not for the short-period mode. Regions of optimal ride and handling qualities are defined for the short-period mode, and the effects of turbulence levels studied. Author

N75-27002# Fairchild Republic Div., Farmingdale, N.Y.
PRELIMINARY DESIGN OF WINGS. VOLUME 1: DESIGN PHILOSOPHY Final Technical Report, Feb. 1971 - Oct. 1972
Harold Switzky Mar. 1974 39 p refs
(Contract F33615-71-C-1241; AF Proj. 1368)
(AD-A003649; AFFDL-TR-74-20-Vol-1) Avail: NTIS CSCL 01/3

A philosophy and methodology for performing preliminary designs of wings are presented. The philosophy is to treat each segment of the problem with a different degree of completeness depending upon the present state of the art. Each segment of the preliminary design is made as complete as possible within the constraints of obtaining a reliable and significant solution within a reasonable time. In segments where an analytical philosophy exists, assumptions are made to result in rapid and relatively accurate solutions. In segments where it is not possible to establish analytical solutions, semi-empirical statistical relationships are sought. GRA

N75-27003# Fairchild Republic Div., Farmingdale, N.Y.
PRELIMINARY DESIGN OF WINGS. VOLUME 2: PRELIMINARY FATIGUE DESIGN Final Technical Report, Feb. 1971 - Oct. 1972
Harold Switzky Mar. 1974 37 p refs
(Contract F33615-71-C-1241; AF Proj. 1368)
(AD-A003650; AFFDL-TR-74-20-Vol-2) Avail: NTIS CSCL 01/3

This report describes an approach for obtaining ultimate tensile design allowables which should result in satisfactory fatigue performance. Thus, fatigue considerations can be included in the original design rather than being checked as an afterthought after the design has been set. This can avoid costly redesigns to obtain structural integrity in fatigue. GRA

N75-27004# Fairchild Republic Div., Farmingdale, N.Y.
PRELIMINARY DESIGN OF WINGS. VOLUME 3: MINIMUM WEIGHT DESIGN OF STIFFENED PLATE Final Technical Report, Feb. 1971 - Oct. 1972
Harold Switzky Mar. 1974 66 p refs
(Contract F33615-71-C-1241; AF Proj. 1368)
(AD-A003651; AFFDL-TR-74-20-Vol-3) Avail: NTIS CSCL 01/3

A design philosophy based upon mathematical logic and structural behavior is developed to obtain the minimum weight design of determinate structures. The philosophy is applied to stiffened skin constructions to obtain a nondimensional minimum weight design procedure and digital program which are readily applicable to any material, temperature, loading, thickness, stiffener spacing or height. Techniques for improving the efficiency by choice of stiffener and material are also presented. The assumptions utilized to analyze and design the structure are reviewed, and their effect upon the weight and margin of safety of the design is assessed. GRA

N75-27005# Naval Postgraduate School, Monterey, Calif.
HYDRAULIC RAM PRESSURE MEASUREMENTS M.S. Thesis
Clifford Milton Holm Dec. 1974 51 p refs
(AD-A004241) Avail: NTIS CSCL 01/3

Hydraulic ram concerns the dynamic loads and catastrophic failure of liquid-filled fuel tanks impacted by high speed projectiles. Hydraulic ram is divided into two phases: the shock phase and the drag phase. Analytic models have been proposed for the shock phase by Yurkovich and for the drag phase by Lundstrom. An attempt was made to correlate these theoretical pressure predictions with experimental data obtained from 0.222 caliber projectiles impacting a small water-filled tank. This comparison showed reasonable correlation but indicates that more work must be done to permit predictions of hydraulic ram pressures accurate enough for the purpose of fuel cell design. GRA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N75-27006 British Library Lending Div., Boston Spa (England).
EXPERIMENTAL INVESTIGATION OF TWO-STAGE TURBINE SECTIONS
A. P. Tatyankin, Ye. V. Vizyaev, V. I. Popkov, A. G. Reznik, V. N. Busurin, A. I. Kirillov, V. A. Chernikov, and E. M. Sheinzon [1974] 7 p refs Transl. into ENGLISH from Energomashinostroenie (Moscow), v. 10, 1972 p 3-5
(BLL-RTS-9484) Avail: British Library Lending Div., Boston Spa, Engl.: £ 1.20; 2 BLL photocopy coupons

An experimental study was made of two stage turbine sections in an effort to determine the exit energy utilization factors, mutual influence of the stages, and other aerodynamic characteristics of the sections. The output of each stage in joint operation in a two stage section was separately determined by a tensometric device, while a hydraulic brake was used to find total shaft torque. Author

N75-27007# Indian Inst. of Tech., Madras. Dept. of Applied Mechanics.
THE INFLUENCE OF LARGE AMPLITUDE ON RESPONSE TO SONIC BOOMS
N. K. Adi Murthy and R. S. Alwar 22 Oct. 1974 28 p refs Backup document for AIAA Synoptic scheduled for publication in AIAA Journal in Oct. 1975
Avail: NTIS HC $3.75

The influence of large amplitude on the dynamic response of rectangular isotropic plate subjected to sonic booms is investigated using a time-wise differentiating technique. Nonlinear differential equations are reduced to a set of linear differential equations with variable coefficients. These linear equations are solved approximately spacewise by Galerkin method and time-wise using the unconditionally stable, implicit, Houbolt scheme, to yield the gradients of the original variables at all time intervals. The problem of nonlinear dynamic response of rectangular plates subjected to sonic booms is analyzed. The influence of nonlinearity on the response is studied in detail and compared with the linear response results for simply supported and clamped boundary conditions. The effect of several parameters like overpressure, shape, duration of pulse and rise time on the response is also investigated. Author

N75-27008*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ACOUSTIC CHARACTERISTICS OF A LARGE SCALE WIND-TUNNEL MODEL OF A JET FLAP AIRCRAFT
Michael D. Falarski, Thomas N. Aiken, and Kiyoshi Aoyagi Washington Jul. 1975 36 p refs Prepared in cooperation with Army Air Mobility R and D Lab., Moffett Field, Calif.
(NASA-TM-X-3263; A-5923) Avail: NTIS HC $3.75 CSCL 20A

The expanding-duct jet flap (EJF) concept is studied to determine STOL performance in turbofan-powered aircraft. The EJF is used to solve the problem of ducting the required volume of air into the wing by providing an expanding cavity between the upper and lower surfaces of the flap. The results are presented of an investigation of the acoustic characteristics of the EJF concept on a large-scale aircraft model powered by JT15D engines. The noise of the EJF is generated by acoustic dipoles as shown by the sixth power dependence of the noise on jet velocity. These sources result from the interaction of the flow turbulence with flap of internal and external surfaces and the trailing edges. Increasing the trailing edge jet from 70 percent span to 100 percent span increased the noise 2 db for the equivalent nozzle area. Blowing at the knee of the flap rather than the trailing edge reduced the noise 5 to 10 db by displacing the jet from the trailing edge and providing shielding from high-frequency noise. Deflecting the flap and varying the angle of attack modified the directivity of the underwing noise but did not affect the peak noise. A forward speed of 33.5 m/sec (110 ft/sec) reduced the dipole noise less than 1 db. Author

N75-27009*# American Airlines, Inc., New York.
ANALYSIS OF TURBOFAN ENGINE PERFORMANCE DETERIORATION AND PROPOSED FOLLOW-ON TESTS
G. P. Sallee, H. D. Kruckenberg, and E. H. Toomey [1975] 130 p
(Contract NAS3-18537)
(NASA-CR-134769) Avail: NTIS HC $5.75 CSCL 21E

Data and engine parts on in-service JT3D and JT8D engines were analyzed and documented relative to engine deterioration. It is concluded that the fan-compressor system of these engines contributes to the long term engine deterioration. An engine test and instrumentation plan was formulated for a proposed follow-on program. The goal of this program is to verify the above conclusion and to attempt to identify more precisely which components of the fan-compressor system are at fault. Author

N75-27010*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMBUSTOR EXHAUST EMISSIONS WITH AIR-ATOMIZING SPLASH-GROOVE FUEL INJECTORS BURNING JET A AND DIESEL NUMBER 2 FUELS
Robert D. Ingebo and Carl T. Norgren Washington Jul. 1975 24 p refs
(NASA-TM-X-3255; E-8297) Avail: NTIS HC $3.25 CSCL 21B

Air-atomizing, splash-groove injectors were shown to improve primary-zone fuel spreading and reduce combustor exhaust emissions for Jet A and diesel number 2 fuels. With Jet A fuel large-orifice, splash-groove injectors the oxides-of-nitrogen emission index was reduced, but emissions of carbon monoxide, unburned hydrocarbons, or smoke were unaffected. Small-orifice, splash-groove injectors did not reduce oxides of nitrogen, but reduced the smoke number and carbon monoxide and unburned-hydrocarbon emission indices. With diesel number 2 fuel, the small-orifice, splash-groove injectors reduced oxides of nitrogen by 19 percent, smoke number by 28 percent, carbon monoxide by 75 percent, and unburned hydrocarbons by 50 percent. Smoke number and unburned hydrocarbons were twice as high with diesel number 2 as with Jet A fuel. Combustor blowout limits were similar for diesel number 2 and Jet A fuels. Author

N75-27011*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FLOW VISUALIZATION OF DISCRETE HOLE FILM COOLING FOR GAS TURBINE APPLICATIONS
Raymond S. Colladay and Louis M. Russell 1975 14 p refs Proposed for presentation at Gas Turbine Heat Transfer Session of the Winter Ann. Conf. of the ASME, Houston, Texas, 30 Nov. - 4 Dec. 1975
(NASA-TM-X-71766; E-8418) Avail: NTIS HC $3.25 CSCL 21E

Film injection from discrete holes in a three row staggered array with 5-diameter spacing is studied. The boundary layer thickness-to-hole diameter ratio and Reynolds number are typical of gas turbine film cooling applications. Two different injection locations are studied to evaluate the effect of boundary layer thickness on film penetration and mixing. Detailed streaklines showing the turbulent motion of the injected air are obtained by photographing neutrally buoyant helium filled soap bubbles which follow the flow field. The bubble streaklines passing

downstream injection locations are clearly identifiable and can be traced back to their origin. Visualization of surface temperature patterns obtained from infrared photographs of a similar film cooled surface are also included. Author

N75-27012*# General Electric Co., Evendale, Ohio.
EXPERIMENTAL CLEAN COMBUSTOR PROGRAM, PHASE 1 Final Report
D. W. Bahr and C. C. Gleason Jun. 1975 264 p refs
(Contract NAS3-16830)
(NASA-CR-134737; GE-74AEG380) Avail: NTIS HC $8.50 CSCL 21E

Full annular versions of advanced combustor designs, sized to fit within the CF6-50 engine, were defined, manufactured, and tested at high pressure conditions. Configurations were screened, and significant reductions in CO, HC, and NOx emissions levels were achieved with two of these advanced combustor design concepts. Emissions and performance data at a typical AST cruise condition were also obtained along with combustor noise data as a part of an addendum to the basic program. The two promising combustor design approaches evolved in these efforts were the Double Annular Combustor and the Radial/Axial Combustor. With versions of these two basic combustor designs, CO and HC emissions levels at or near the target levels were obtained. Although the low target NOx emissions level was not obtained with these two advanced combustor designs, significant reductions were relative to the NOx levels of current technology combustors. Smoke emission levels below the target value were obtained. Author

N75-27013*# AiResearch Mfg. Co., Torrance, Calif.
HYPERSONIC RESEARCH ENGINE PROJECT. PHASE 2: AEROTHERMODYNAMIC INTEGRATION MODEL (AIM) TEST REPORT
W. L. Andersen and L. Kado 19 May 1975 201 p refs
(Contract NAS1-6666)
(NASA-CR-132655; AiResearch-74-10784) Avail: NTIS HC $7.25 CSCL 21E

The Hypersonic Research Engine-Aerothermodynamic Integration Model (HRE-AIM) was designed, fabricated, and tested in the Hypersonic Tunnel Facility. The HRE-AIM is described along with its installation in the wind tunnel facility. Test conditions to which the HRE-AIM was subjected and observations made during the tests are discussed. The overall engine performance, component interaction, and ignition limits for the design are evaluated. Author

N75-27014# ARO, Inc., Arnold Air Force Station, Tenn.
STATISTICAL PREDICTION OF MAXIMUM TIME VARIANT INLET DISTRIBUTION LEVELS Final Report, 1 Jul. 1972 - 30 Jun. 1974
J. L. Jacocks AEDC Jan. 1975 76 p refs
(AD-A004104; ARO-PWT-TR-74-81; AEDC-TR-74-121) Avail: NTIS CSCL 21/5

Time-variant inlet pressure data from several aircraft designs are analyzed using tools based on Gumbel's extreme-value statistics with the results illustrating the basic randomness of distortion factors. A probabilistic model of distortion is proposed with three parameters to be evaluated by fitting to inlet data by the method of maximum likelihood. The effects of data acquisition time, frequency bandwidth, and sampling rate are discussed in context with Moore's similarity parameter to indicate scalability of the dynamic inlet distortion data. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N75-27015*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
FLIGHT EVALUATION OF THE M2-F3 LIFTING BODY HANDLING QUALITIES AT MACH NUMBERS FROM 0.30 TO 1.61
Robert W. Kempel, William H. Dana, and Alex G. Sim Washington Jul. 1975 43 p refs
(NASA-TN-D-8027; H-852) Avail: NTIS HC $3.75 CSCL 01C

Percentage distributions of 423 pilot ratings obtained from 27 flights are used to indicate the general level of handling qualities of the M2-F3 lifting body. Percentage distributions are compared on the basis of longitudinal and lateral-directional handling qualities, control system, control system status, and piloting task. Ratings of longitudinal handling qualities at low speed were slightly better than those for transonic and supersonic speed. The ratings of lateral-directional handling qualities were unaffected by speed and configuration. Specific handling qualities problems are discussed in detail, and comparisons are made with pertinent handling qualities criteria. Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

N75-27016 Missouri Univ., Rolla.
NUMERICAL MODELING OF THE EARLY STAGE OF CLOUD FORMATION IN A SIMULATION CHAMBER Ph.D. Thesis
Adel Nassif Saad 1974 137 p
Avail: NTIS Avail: Univ. Microfilms Order No. 75-15850

A numerical model is developed to simulate the growth of cloud droplets by condensation upon a spectrum of hygroscopic nuclei. The model is applicable to cloud simulation chamber conditions as well as to the study of the role of these nuclei on cloud microstructure. Equations are given for the growth by condensation of water vapor on a population of hygroscopic nuclei in a volume being cooled by expansion. The equations are integrated simultaneously, using Hamming's modified predictor-corrector method for given initial conditions, to obtain the droplet size distribution, temperature, pressure, supersaturation, and liquid water content. Temperature fluctuations, sedimentation of droplets, seeding with hygroscopic nuclei, and the effect of surface films in retarding the growth of nuclei are also considered. Results are presented and discussed.
Dissert. Abstr.

N75-27017# Aeronautical Research Labs., Melbourne (Australia).
FLOW VISUALISATION BY THE VAPOUR SCREEN TECHNIQUE IN THE ARL HYPERSONIC TUNNEL
M. J. Williams and D. C. Collis Jan. 1975 25 p refs
(ARL/A-Note-354) Avail: NTIS HC $3.25

A description is given of simple apparatus and technique giving good flow visualization by vapor screen method in condensing flow. The application of the method to bodies of widely varying geometry in hypersonic flow is demonstrated by several examples. A feature of the technique is the ability to display a cross-section of the flow and thus reveal flow features not shown by conventional schlieren methods. An examination was made of the validity of using data, obtained by the use of this technique, to predict behavior in sub-saturated flow conditions. Author

N75-27018*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE 7.5 kW SOLAR ARRAY SIMULATOR
R. R. Robson 1975 11 p refs Proposed for presentation at 11th Propulsion Conf., Anaheim, Ca., 29 Sep. - 1 Oct. 1975; cosponsored by the AIAA and the SAE
(NASA-TM-X-71757; E-8402) Avail: NTIS HC $3.25 CSCL 14B

A high power solar array simulator capable of providing the input power to simultaneously operate two 30 cm diameter ion thruster power processors was designed, fabricated, and tested. The maximum power point is set to between 150 and 7500 watts representing an open circuit voltage from 50 to

300 volts and a short circuit current from 4 to 36 amps. Illuminated solar cells are used as the control element to provide a true solar cell characteristic and permit the option of simulating changes in this characteristic due to variations in solar intensity and/or temperature of the solar array. This is accomplished by changing the illumination and/or temperature of the control cells. The response of the output to a step change in load closely approximates that of an actual solar array. Author

N75-27019# Naval Medical Research Inst., Bethesda, Md. Behavioral Sciences Dept.
NMRI HYPERBARIC RESEARCH ANIMAL FACILITY Medical Research Progress Report No. 9
James M. Woolley Aug. 1974 25 p refs Repr. from NMRI Research Rept. No. 8
(AD-A004637) Avail: NTIS CSCL 06/19

A hyperbaric animal research facility designed to provide maximum safe utilization of three hyperbaric chambers operating separately or simultaneously with a minimum of personnel is described. Each chamber has a volume of 170 liters, will operate under pressure conditions from ambient to 1,000 psig, and will withstand temperatures to 121C. Specifications for the components of the complex are provided, including a diagram and illustrations. GRA

N75-27020# Technische Hogeschool, Delft (Netherlands).
TRANSIENT BEHAVIOR OF AN ADIABATIC FIXED-BED METHANATOR
Hans Vandoesburg 1974 152 p refs
Avail: NTIS HC $6.25

Experimental data on the transient behavior of adiabatic fixed-bed methanators are compared with theoretical predictions by means of calculations with a mathematical model. The general aspects of reactor modeling are reviewed along with the results of a kinetic investigation into the carbon oxide methanation. A model for the methanator is developed considering heat and mass transport phenomena on the basis of theory and experimental data. The model equations are presented and the method of solution is discussed. Measurements on methanator dynamics are described and compared with model calculations. Data are given on the methanation of mixtures of CO and CO2 in hydrogen. Results are applied to the dynamics of industrial methanators. Author

N75-27021# ARO, Inc., Arnold Air Force Station, Tenn.
EVALUATION OF A WEDGE ON A FORCE BALANCE AS A FLOW ANGLE PROBE Final Report
H. Maxwell and W. Luchuk AEDC Feb. 1975 68 p refs
(AD-A004765; AEDC-TR-74-110; ARO-PWT-TR-74-88) Avail: NTIS CSCL 20/4

A wedge wing on a force balance, designed for use at Mach numbers 1.6 and 2.0, has been evaluated as a continuously moving flow angle probe and calibrated in the range of Mach numbers from 0.6 to 1.3. Moving at standard speeds of the Captive Trajectory System (CTS), it has proved to be accurate and repeatable when operating in the three translational modes and the roll mode. Performance is also reported in the pitch and yaw motions. An extensive survey made at Mach number 0.6 shows the flow direction in the 4 tunnels used to be upward and toward the north wall with maximum components of 0.58 deg in pitch and 0.52 deg in yaw. GRA

N75-27022# National Bureau of Standards, Washington, D.C. Mechanics Div.
MECHANICAL TESTS OF FAA-E2491 AIRPORT INPAVEMENT APPROACH AND THRESHOLD LIGHTS Final Report
Donald C. Robinson Jan. 1975 28 p refs Sponsored in part by FAA
(COM-75-10418/2; NBSIR-75-647) Avail: NTIS HC $3.75 CSCL 01E

Static and impact load tests were performed on two style FAA-E-2491 airport in-pavement approach and threshold lights which were mounted in light bases encased in concrete. State tests were conducted using either a 6-inch diameter steel plate or a rubber pad through which loads were applied to the center of the light optical cover assembly. Drop tests were conducted using a 5-lb steel ball which was directed to impact at various locations on the optical cover assembly. The old style lights were found to comply with load requirements for the current specification. The maximum load sustained by both style lights when loaded through a rubber pad was about two-thirds of the maximum load sustained when loading directly through the steel plate. GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N75-27023*# Little (Arthur D.), Inc., Cambridge, Mass.
FLOAT ZONE PROCESSING IN A WEIGHTLESS ENVIRONMENT Summary Report
A. A. Fowle, J. S. Haggerty, P. F. Strong, G. Rudenberg, and R. Kronauer (Harvard Univ.) Oct. 1974 70 p refs
(Contract NAS8-29877)
(NASA-CR-143876) Avail: NTIS HC $4.25 CSCL 22A

Results are given for investigations into: (1) the physical limits which set the maximum practical diameters of Si crystals that can be processed by the float-zone method in a near weightless environment, and (2) the economic impact of large, space-produced Si crystals on the electronics industry. The stability of the melt is evaluated. Heat transfer and fluid flow within the melt as dependent on the crystal size and the degree and type of rotation imparted to the melt are studied. Methods of utilizing the weightless environment for the production of large, stress-free Si crystals of uniform composition are proposed. The economic effect of large size Si crystals, their potential applications, likely utilization and cost advantages in LSI, integrated circuits, and power devices are also evaluated. Foreseeable advantages of larger diameter wafers of good characteristics and the possibilities seen for greater perfection resulting from stress-free growth are discussed. Author

N75-27024*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
APOLLO EXPERIENCE REPORT: GUIDANCE AND CONTROL SYSTEMS. MISSION CONTROL PROGRAMMER FOR UNMANNED MISSIONS AS-202, APOLLO 4, AND APOLLO 6
Gene F. Holloway Washington Jul. 1975 60 p
(NASA-TN-D-7992; JSC-S-432) Avail: NTIS HC $4.25 CSCL 22B

An unmanned test flight program required to evaluate the command module heat shield and the structural integrity of the command and service module/Saturn launch vehicle is described. The mission control programer was developed to provide the unmanned interface between the guidance and navigation computer and the other spacecraft systems for mission event sequencing and real-time ground control during missions AS-202, Apollo 4, and Apollo 6. The development of this unmanned programer is traced from the initial concept through the flight test phase. Detailed discussions of hardware development problems are given with the resulting solutions. The mission control programer functioned correctly without any flight anomalies for all missions. The Apollo 4 mission control programer was reused for the Apollo 6 flight, thus being one of the first subsystems to be reflown on an Apollo space flight. Author

N75-27025*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
APOLLO EXPERIENCE REPORT: ENGINEERING AND ANALYSIS MISSION SUPPORT
Robert W. Fricke, Jr. Washington Jul. 1975 104 p
(NASA-TN-D-7993; JSC-S-438) Avail: NTIS HC $5.25 CSCL 22A

The tasks performed by the team of specialists that evaluated hardware performance during prelaunch checkout and in-flight operation are discussed. The organizational structure, operational procedures, and interfaces as well as the facilities and software required to perform these tasks are discussed. The scope of the service performed by the team and the evaluation philosophy are described. Summaries of problems and their resolution are included as appendixes. Author

N75-27026*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
APOLLO EXPERIENCE REPORT GUIDANCE AND CONTROL SYSTEMS: LUNAR MODULE ABORT GUIDANCE SYSTEM
Pat M. Kurten Washington Jul. 1975 73 p
(NASA-TN-D-7990; JSC-S-424) Avail: NTIS HC $4.25 CSCL 22B

The history of a unique development program that produced an operational fixed guidance system of inertial quality is presented. Each phase of development, beginning with requirement definition and concluding with qualification and testing, is addressed, and developmental problems are emphasized. Software generation and mission operations are described, and specifications for the inertial reference unit are included, as are flight performance results. Significant program observations are noted. Author

N75-27027*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
APOLLO EXPERIENCE REPORT: GUIDANCE AND CONTROL SYSTEMS: AUTOMATED CONTROL SYSTEM FOR UNMANNED MISSION AS-201
Gene F. Holloway Washington Jul. 1975 15 p
(NASA-TN-D-7991; JSC-S-431) Avail: NTIS HC $3.25 CSCL 22B

The Apollo command module heat shield and Apollo command and service module/Saturn launch vehicle structural integrity were evaluated in an unmanned test flight. An automated control system was developed to provide the mission event sequencing, the real-time ground control interface, and the backup attitude reference system for the unmanned flight. The required mission events, the design logic, the redundancy concept, and the ground-support-equipment concept are described and some development problem areas are discussed. The mission event time line and the real-time ground command list are included to provide an outline of the control system capabilities and requirements. The mission was accomplished with the automated control system, which functioned without flight anomalies.
Author

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N75-27028 British Library Lending Div., Boston Spa (England).
SOYUZ-APOLLO SCIENTIFIC MISSION
B. Gerasimov [1974] 3 p Transl. into ENGLISH from Sotsialisticheskaya Industria (USSR), 16 Apr. 1974
(BLL-M-23501-(5828.4F)) Avail: British Library Lending Div. Boston Spa, Engl.: 1 BLL photocopy coupon

The scientific investigations to be performed aboard the spacecraft and the joint training of the crews for the Apollo-Soyuz Test Project are briefly discussed. Investigation concerning the solar corona, the structure of upper atmosphere, and the effect of weightlessness on smelting and crystallization are included.
J.M.S.

N75-27029 Louisiana State Univ. and A&M Coll., Baton Rouge.
FINITE RATE CHEMISTRY EFFECTS UPON CONVECTIVE AND RADIATIVE HEATING OF AN ATMOSPHERIC ENTRY VEHICLE Ph.D. Thesis
Guillermo Perez 1974 337 p
Avail: Univ. Microfilms Order No. 75-14277

A mathematical model of the aerothermochemical environment along the stagnation line of a planetary return spacecraft using an ablative thermal protection system was developed and solved for conditions typical of atmospheric entry from planetary missions. The model was designed to predict viscous, reactive and radiative coupled shock layer structure and the resulting body heating rates. The analysis included flow field coupling with the ablator surface, binary diffusion, coupled line and continuum radiation and equilibrium or finite rate chemistry effects. The gas model used includes thermodynamic, transport, kinetic and radiative properties of air and ablation product species, including 19 chemical species and 16 chemical reactions. Specifically, the impact of nonequilibrium chemistry effects upon stagnation line shock layer structure and body heating rates was investigated. It was also concluded that, for the flight conditions considered, finite-rate chemistry effects are significant since both shock layer structure and body heating rates are markedly different from those predicted by chemical equilibrium analyses. Dissert. Abstr.

N75-27030*# Kanner (Leo) Associates, Redwood City, Calif.
MODERN ACHIEVEMENTS OF COSMONAUTICS
B. Petrov, A. Koval, K. Bushuyev, A. Vinogradov, S. Sokolov, K. Kondratyev, A. Nikolayev, V. Sevastyanov, G. Narimanov, N. Pisarenko et al Washington NASA Jul. 1975 48 p Transl. into ENGLISH from Sovrem. Dostizh. Kosmonavtiki (Moscow), no. 12, 1973 64 p
(Contract NASw-2481)
(NASA-TT-F-16424) Avail: NTIS HC $3.75 CSCL 22C

This collection on astronautics and astronomy, is a general-level summary of recent progress in space sciences. It is based on materials previously published in unspecified sources in the Soviet central press, with various chapters written by Soviet specialists in the individual fields. Of particular interest in the field of manned flight is the chapter on mutual aid in space. Various aspects of docking in space are examined along with the various points in terms of the Apollo-Soyuz Training Program, with some reference to previous Soviet experience in the flights of Soyuz-4, -5 and -11. Author

N75-27031*# Kanner (Leo) Associates, Redwood City, Calif.
CONQUEST OF OUTER SPACE IN THE USSR IN 1973 (ACCORDING TO PRESS MATERIALS)
R. Z. Sagdeyev, ed. Washington NASA Jul. 1975 483 p Transl. into ENGLISH from the book "Osvoyeniye Kosmicheskogo Prostranstva v SSSR 1973 (po materialam pechati)" Moscow, Nauka Press, p 1-304
(Contract NASw-2481)
(NASA-TT-F-16372) Avail: NTIS HC $12.00 CSCL 22A

A collection of selected articles from Soviet newspapers and magazines in 1973 covering Soviet space research in 1973 is presented. Topics included are: (1) manned flights; (2) applications of space findings in weather forecasting, radio astronomy, and terrestrial radio wave propagation; (3) space and the economy; (4) studies of the moon; (5) studies of Mars; and (6) international cooperation. Author

N75-27032*# McDonnell-Douglas Automation Co., St. Louis, Mo.
FEASIBILITY STUDY OF LOW ANGLE PLANETARY ENTRY
R. E. DeFrees May 1975 52 p refs
(Contract NAS2-8377)
(NASA-CR-137645) Avail: NTIS HC $4.25 CSCL 22C

The feasibility of a Jovian entry by a probe originally designed for Saturn and Uranus entries is examined. An entry probe is described which is capable of release near an outer planet's sphere of influence and descent to a predetermined target entry point in the planet's atmosphere. The probe is designed so as to survive the trapped particle radiation belts and an entry heating pulse. Data is gathered and relayed to an overflying spacecraft bus during descent. Probe variations for two similar missions are described. In the first flyby of Jupiter by a Pioneer spacecraft launched during the 1979 opportunity is examined parametrically. In the second mission an orbiter based on Pioneer and launched in 1980 is defined in specific terms. The differences rest in the science payloads and directly affected wiring and electronics packages. J.M.S.

N75-27033*# National Aeronautics and Space Administration, Washington, D.C.
VIKING MARS LAUNCH SET FOR AUGUST 11
Nicholas Panagakos [1975] 120 p
(NASA-News-Release-75-183) Avail: NASA Scientific and Technical Information Facility, P. O. Box 8756, Baltimore/Washington International Airport, Md. 21240 CSCL 22C

The 1975-1976 Viking Mars Mission is described in detail, from launch phase through landing and communications relay phase. The mission's scientific goals are outlined and the various Martian investigations are discussed. These investigations include:

geological photomapping and seismology; high-resolution, stereoscopic horizon scanning; water vapor and thermal mapping; entry science; meteorology; atmospheric composition and atmospheric density; and, search for biological products. The configurations of the Titan 3/Centaur combined launch vehicles, the Viking orbiters, and the Viking landers are described; their subsystems and performance characteristics are discussed. Preflight operations, launch window, mission control, and the deep space tracking network are also presented. L.B.

N75-27034*# Scientific Translation Service, Santa Barbara, Calif.
SALYUT 4: REPAIR AND MAINTENANCE WORK
B. Konovalov, A. Pokrovskiy, and B. Gerasimov Washington NASA 16 Jun. 1975 22 p Transl. into ENGLISH from various Russian newspapers
(Contract NASw-2483)
(NASA-TT-F-16327) Avail: NTIS HC $3.25 CSCL 22C

The maintenance work required on some Salyut 4 equipment is presented. The servosystem on a solar telescope initially would not focus on the sun and to correct the problem, a group of engineers went to the Crimean Astrophysical Observatory where they developed a solution using a model of the telescope. To implement the solution, the cosmonauts were required to determine the telescope mirror position, which they did by the impromptu use of a medical stethoscope. However, much of Salyut 4's equipment had been built for easy access in case of repair, and special instruments and spare parts were included; e.g., the cosmonauts easily replaced a switch. They also successfully recoated the surface of the telescope mirrors.
Author

N75-27035# Tokyo Univ. (Japan).
A GRAPHICAL SOLUTION OF OPTIMUM TIME-FIXED TWO-IMPULSE RENDEZVOUS PROBLEM
Kuninori Uesugi May 1975 14 p refs Repr. from Inst. of Space and Aeron Sci., Univ. of Tokyo Report 527, v. 40, no. 7, May 1975 p 191-204 Presented at the 35th IAF Congr., Amsterdam, 30 Sep. - 5 Oct. 1974
(ISAS-527-Vol-40-No-7) Avail: NTIS HC $3.25

A method for numerical determination of optimum time fixed two impulse rendezvous between general orbits is described. The impulse function is numerically investigated and a geometric representation of impulse function in the takeoff-arrival time plane is adopted. This geometric representation (T-space) allows visualization of equivelocity increment contours, thus revealing the minimum value as a point in this space. Optimum take-off and arrival time is obtained. By combining these maps it is possible to obtain an optimum solution to the problem of multi-target rendezvous. The optimum impulse value is computed by utilizing McCue's adaptive descent method. Author

N75-27036# Federal Communications Commission, Washington, D.C. Research and Standards Div.
THE QUASI-STATIONARY SATELLITE ORBIT
John C. H. Wang and Elton D. Davis Jan. 1975 67 p
(PB-240349/1; FCC/OCE/RS75-010) Avail: NTIS HC $4.25 CSCL 22B

Three or four satellites equally spaced in a quasi-stationary satellite orbit can provide continuous earth coverage, but with advantages and disadvantages with respect to satellites in geostationary satellite orbit. This report presents general purpose equations, computer programs, and tables for studying orbits with any reference longitude and inclination. Results of a sample system having eleven earth stations and a specific orbit with a reference longitude of 75 degrees west and an inclination of 60 degrees are also presented. GRA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N75-27037 British Library Lending Div., Boston Spa (England).
INTERCOSMOS-11: ONE FROM THE SOLAR SERIES
Yu. Apenchenko [1974] 4 p Transl. into ENGLISH from Pravda (USSR), 18 May 1974
(BLL-M-23520-(5828.4F)) Avail: British Library Lending Div. Boston Spa, Engl.: 1 BLL photocopy coupon

Scientific discoveries and development in the area of cosmic research are briefly discussed. The role of the intercosmos satellites in studying the effect of solar radiation on the structure of the upper atmosphere is emphasized. J.M.S.

N75-27038*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ATTITUDE ESTIMATION OF EARTH ORBITING SATELLITES BY DECOMPOSED LINEAR RECURSIVE FILTERS
Shauying R. Kou May 1975 31 p refs
(NASA-TM-X-64943) Avail: NTIS HC $3.75 CSCL 22A

Attitude estimation of earth orbiting satellites (including Large Space Telescope) subjected to environmental disturbances and noises was investigated. Modern control and estimation theory is used as a tool to design an efficient estimator for attitude estimation. Decomposed linear recursive filters for both continuous-time systems and discrete-time systems are derived. By using this accurate estimation of the attitude of spacecrafts, state variable feedback controller may be designed to achieve (or satisfy) high requirements of system performance. Author

N75-27039*# Boeing Aerospace Co., Seattle, Wash.
SEASAT STUDY DOCUMENTATION
1 Apr. 1974 164 p Prepared for JPL
(Contract JPL-953801)
(NASA-CR-143143; D2-116294-1) Avail: NTIS HC $6.25 CSCL 22B

The proposed spacecraft consists of a bus module, containing all subsystems required for support of the sensors, and a payload module containing all of the sensor equipment. The two modules are bolted together to form the spacecraft, and electrical interfaces are accomplished via mated connectors at the interface plane. This approach permits independent parallel assembly and test operations on each module up until mating for final spacecraft integration and test operations. Proposed program schedules recognize the need to refine sensor/spacecraft interfaces prior to proceeding with procurement, reflect the lead times estimated by suppliers for delivery of equipment, reflect a comprehensive test program, and provide flexibility for unanticipated problems. The spacecraft systems are described in detail along with aerospace ground equipment, ground handling equipment, the launch vehicle, imaging radar incorporation, and systems tests. Author

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N75-27040* National Aeronautics and Space Administration, Washington, D.C.
FOLDING STRUCTURE FABRICATED OF RIGID PANELS Patent
William R. Hilker (Northrop Corp., Hawthorne, Calif.) and Robert S. Fujioka, inventors (to NASA) (Northrop Corp., Hawthorne, Calif.) Issued 21 Sep. 1965 9 p Filed 24 Jun. 1963 Sponsored by NASA
(NASA-Case-XHQ-02146; US-Patent-3,206,897; US-Patent-Appl-SN-290043; US-Patent-Class-52-71) Avail: US Patent Office CSCL 22B

An expandable structure comprised of a plurality of rigid panels constructed in a manner enabling the structure to be mechanically actuated between unexpanded and expanded states is described. The structure is adapted for use in space exploration and is designed to provide a rigid protective enclosure for personnel and/or supplies in space.
Official Gazette of the U.S. Patent Office

N75-27041* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.
VARIABLE RATIO MIXED-MODE BILATERAL MASTER-SLAVE CONTROL SYSTEM FOR SHUTTLE REMOTE MANIPULATOR SYSTEM Patent
Fredrick J. Greeb (Martin Marietta Corp., Denver), Shepard B. Brodie (Martin Marietta Corp., Denver), and Carl R. Flatau, inventors (to NASA) (Martin Marietta Corp., Denver) Issued 8 Jul. 1975 13 p Filed 20 Aug. 1973 Supersedes N73-30832 (11 - 21, p 2599) Sponsored by NASA
(NASA-Case-MSC-14245-1; US-Patent-3,893,573; US-Patent-Appl-SN-389916; US-Patent-Class-214-1CM) Avail: US Patent Office CSCL 22B

A control system for a remotely operated manipulator system which incorporates a slave arm of substantial length and strength having multiple degrees of freedom at an adequate number of joints to enable the arm to accomplish specified tasks, and a master arm for use by an operator was disclosed. The two are operated by a servo system which provides a variable ratio which is varied dependent on the task required for the slave arm. Gross movements of the slave arm are readily accomplished with small movements of the master. When the manipulator arm is close to the target, the ratio is preferably changed providing better master-arm response to the operator to enable grasping with the manipulator terminal device.
Official Gazette of the U.S. Patent Office

N75-27042*# Martin Marietta Aerospace, Denver, Colo.
PAYLOAD/ORBITER CONTAMINATION CONTROL REQUIREMENT STUDY Final Report
L. E. Bareiss and E. B. Ress 30 Jun. 1975 175 p refs
(Contract NAS8-30755)
(NASA-CR-143883; MCR-75-202) Avail: NTIS HC $6.25 CSCL 22B

The results of a contamination impact analysis upon the spacelab carrier and the spacelab carrier upon some of its potential payloads are presented. These results are based upon contamination computer modeling techniques developed to predict the induced environment for spacelab and to provide the basis for evaluation of the predicted environment against the current on orbit contamination control criteria as specified for payloads. Those spacelab carrier contamination sources evaluated against the stated contamination control criteria were outgassing/offgassing of the major nonmetallic thermal control coating of the spacelab carriers, spacelab core and experiment module and tunnel cabin atmosphere leakage, avionics bay vent, spacelab condensate vent, random particulate sloughing, and the return flux of the molecular content of these sources from the gas-gas interactions with the ambient orbital environment. It is indicated that the spacelab carrier can meet the intent of the contamination control criteria through incorporating known contamination control practices.
Author

N75-27043# Paul Sabaiter Univ., Toulouse (France).
CONTRIBUTION OF THE STUDY OF NONLINEAR RECURRENCE SOLUTIONS: APPLICATION TO THE STUDY OF CERTAIN MODULATION SYSTEMS Ph.D. Thesis [CONTRIBUTION A L'ETUDE DES SOLUTIONS DES RECURRENCES NON LINEAIRES: APPLICATION A L'ETUDE DE CERTAINS SYSTEMES A MODULATION]
Jacques Bernussou 22 Apr. 1974 155 p refs In FRENCH
(Publ-1129) Avail: NTIS HC $6.25 CSCL 22B

The effects of active perturbations on a satellite propulsion system were evaluated; correction procedures for any perturbation caused orbit deviations are given. Data are given on the principle characteristics of different electric propulsion systems, correction procedures for North-South and East-West orbits, and satellite attitude control. Economics, constraints, and disadvantages of introducing electric propulsion in standard systems were investigated.
Transl. by E.H.W.

N75-27044*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A STUDY OF TOTAL SPACE LIFE PERFORMANCE OF GSFC SPACECRAFT
A. R. Timmins Washington Jul. 1975 14 p refs
(NASA-TN-D-8017) Avail: NTIS HC $3.25 CSCL 22B

The space life performance of 57 Goddard Space Flight Center spacecraft is given. The time distribution of 449 malfunctions, of which 248 were classified as failures, is presented. Test data were available for 39 of the spacecraft and permitted a comparison of system test performance with the first-day, first-month, and total space life performance. The failures per spacecraft for the system environmental tests and the three time periods in space were 12, 0.9, 1.7, and 5.0, respectively. Relevance of the data to the pre-shuttle and shuttle eras is discussed. Classifications of failures by type of device and spacecraft subsystem are included. A continuation of the Goddard philosophy of requiring a system-level environmental test program is justified.
Author

N75-27045*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF TESTS OF A ROCKWELL INTERNATIONAL SPACE SHUTTLE ORBITER (-139 CONFIGURATION) 0.0175-SCALE MODEL (NO. 29-0) IN AEDC TUNNEL F TO DETERMINE HYPERSONIC HEATING EFFECTS (OH11)

M. Quan (Rockwell Intern., Downey, Calif.) May 1975 103 p refs
(Contract NAS9-13247)
(NASA-CR-141538; DMS-DR-2141) Avail: NTIS HC $5.25 CSCL 22B

Results from wind tunnel tests to determine hypersonic aerodynamic heating rates on a NASA/Rockwell Space Shuttle Orbiter are reported. The tests were to determine Mach number effects, if any, and to obtain overall heating rate data at high Mach numbers from 10.5 to 16. The model used was a 0.0175-scale model built to Rockwell Orbiter lines VL70-000139. The model identity number is 29-0. These tests, designated OH11, were conducted in the AEDC Tunnel F. Author

N75-27046*# Chrysler Corp., New Orleans, La. Space Div.
HEAT TRANSFER TESTS OF AN 0.006-SCALE THIN-SKIN SPACE SHUTTLE THERMOCOUPLE MODEL (41-OTS) IN THE LANGLEY RESEARCH CENTER UNITARY PLAN WIND TUNNEL AT M EQUALS 3.7 (IH16)
D. G. Walstad (Rockwell Intern., Downey, Calif.) Jun. 1975 700 p
(Contract NAS9-13247)
(NASA-CR-141534; DMS-DR-2166) Avail: NTIS HC $15.25 CSCL 22B

The results are presented of supersonic heat transfer tests performed on the .006 scale space shuttle vehicle model (41-OTS) in the Langley Research Center Unitary Plan Wind Tunnel. These tests were conducted to parametrically investigate ascent heating of the integrated vehicle and its components. The tests were conducted at a nominal Mach number of 3.7 and Reynolds numbers per foot of 2 and 5 million. The model configurations investigated were the integrated vehicle and each component alone (i.e. orbiter, tank and SRB). All the configurations were run with and without transition strips and through an angle of attack range of 0 deg to minus 5 deg with the exception of the SRB which was tested through an angle of attack range of minus 5 deg to 90 deg. The heat transfer data were obtained from 223 iron constantan thermocouples attached to stainless steel thin-skin areas of the model. Author

N75-27047*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF A JET PLUME EFFECTS TEST ON ROCKWELL INTERNATIONAL INTEGRATED SPACE SHUTTLE VEHICLE USING A VEHICLE 5 CONFIGURATION 0.02-SCALE MODEL (88-OTS) IN THE 11 BY 11 FOOT LEG OF THE NASA/AMES RESEARCH CENTER UNITARY PLAN WIND TUNNEL (IA19), VOLUME 1
M. E. Nichols (Rockwell Intern. Corp., Downey, Calif.) Jun. 1975 899 p
(Contract NAS9-13247)
(NASA-CR-141543; DMS-DR-2170-Vol-1) Avail: NTIS HC $19.25 CSCL 22B

Results are presented of jet plume effects test IA19 using a vehicle 5 configuration integrated space shuttle vehicle 0.02-scale model in the NASA/Ames Research Center 11 x 11-foot leg of the unitary plan wind tunnel. The jet plume power effects on the integrated vehicle static pressure distribution were determined along with elevon, main propulsion system nozzle, and solid rocket booster nozzle effectiveness and elevon hinge moments. Author

N75-27048*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF A JET PLUME EFFECTS TEST ON THE ROCKWELL INTERNATIONAL INTEGRATED SPACE SHUTTLE VEHICLE USING A VEHICLE 5 CONFIGURATION 0.02-SCALE MODEL (88-OTS) IN THE 11 X 11 FOOT LEG OF THE NASA/AMES RESEARCH CENTER UNITARY PLAN WIND TUNNEL (IA19), VOLUME 2
M. E. Nichols (Rockwell Intern. Corp., Downey, Calif.) Jun. 1975 879 p
(Contract NAS9-13247)
(NASA-CR-141544; DMS-DR-2170-Vol-2) Avail: NTIS HC $19.25 CSCL 22B
For abstract, see N75-27047.

N75-27049*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF A JET PLUME EFFECTS TEST ON THE ROCKWELL INTERNATIONAL INTEGRATED SPACE SHUTTLE VEHICLE USING A VEHICLE 5 CONFIGURATION 0.02-SCALE MODEL (88-OTS) IN THE 11 BY 11 FOOT LEG OF THE NASA/AMES RESEARCH CENTER UNITARY PLAN WIND TUNNEL (IA19), VOLUME 3
M. E. Nichols (Rockwell Intern. Corp., Downey, Calif.) Jun. 1975 1256 p
(Contract NAS9-13247)
(NASA-CR-141545; DMS-DR-2170-Vol-3) Avail: NTIS HC $33.25 CSCL 22B
For abstract, see N75-27047.

N75-27050*# General Dynamics/Convair, San Diego, Calif.
SPACE TUG/SHUTTLE INTERFACE COMPATIBILITY STUDY. VOLUME 1: EXECUTIVE SUMMARY Final Report
Jun. 1975 40 p refs 4 Vol.
(Contract NAS8-31012)
(NASA-CR-120650; CASD-NAS-75-017-Vol-1) Avail: NTIS HC $3.75 CSCL 22B

Shuttle interfaces required for space tug accommodation are primarily involved with supporting and servicing the tug during launch countdown, flight, and postlanding; deploying and retrieving the tug on orbit; and maintaining control over the tug when it is in or near the orbiter. Each of these interface areas was investigated to determine the best physical and operational method of accomplishing the required functions, with an overriding goal of establishing simple and flexible orbiter interface requirements suitable for tug, tug payloads, IUS and other cargo. It is concluded the orbiter payload accommodations and the MSFC baseline tug are generally interface compatible. Specific minor changes to tug and orbiter interfaces were identified to provide full compatibility. A system concept for supporting and deploying tug from orbiter is described. Author

N75-27051*# General Dynamics/Convair, San Diego, Calif.
SPACE TUG/SHUTTLE INTERFACE COMPATIBILITY STUDY. VOLUME 2: TUG/PAYLOAD/ORBITER INTERFACE ANALYSES Final Report, Jul. 1974 - Mar. 1975
Jun. 1975 447 p refs 4 Vol.
(Contract NAS8-31012)
(NASA-CR-120651; CASD-NAS-75-017-Vol-2) Avail: NTIS HC $11.25 CSCL 22B
For abstract, see N75-27050.

N75-27052*# General Dynamics/Convair, San Diego, Calif.
SPACE TUG/SHUTTLE INTERFACE COMPATIBILITY STUDY. VOLUME 2: TUG/PAYLOAD/ORBITER INTERFACE ANALYSES, APPENDICES Final Report, Jul. 1974 - Mar. 1975
Jun. 1975 262 p refs 4 Vol.
(Contract NAS8-31012)
(NASA-CR-120652; CASD-NAS-75-017-Vol-2) Avail: NTIS HC $8.50 CSCL 22B
For abstract, see N75-27050.

N75-27053*# General Dynamics/Convair, San Diego, Calif.
SPACE TUG/SHUTTLE INTERFACE COMPATIBILITY STUDY. VOLUME 3: TUG/PAYLOAD/ORBITER INTERFACE REQUIREMENTS Final Report, Jul. 1974 - Mar. 1975
Jun. 1975 183 p refs 4 Vol.
(Contract NAS8-31012)
(NASA-CR-120653; CASD-NAS-75-017-Vol-3) Avail: NTIS HC $7.00 CSCL 22A
For abstract, see N75-27050.

N75-27054*# General Dynamics/Convair, San Diego, Calif.
SPACE TUG/SHUTTLE INTERFACE COMPATIBILITY STUDY. VOLUME 4: COST ANALYSIS Final Report, Jul. 1974 - Mar. 1975
Jun. 1975 107 p 4 Vol.
(Contract NAS8-31012)
(NASA-CR-120654; CASD-NAS-75-017-Vol-4) Avail: NTIS HC $5.25 CSCL 22A
For abstract, see N75-27050.

N75-27055# Colorado Univ., Boulder. Dept. of Aerospace Engineering Sciences.

A STUDY OF VERY HIGH ALTITUDE MANEUVERS USING AERODYNAMIC FORCES. VOLUME 3: ON THE USE OF AERODYNAMIC FORCES TO EFFECT MANEUVERS OF ORBITING VEHICLES Final Report, 2 Jan. 1971 - 2 Jan. 1974

Adolf Busemann, Robert D. Culp, and Ching-Yew Yang Sep. 1974 97 p refs

(Contract F33615-71-C-1103; AF Proj. 7071)

(AD-A004184; ARL-74-0104-Vol-3) Avail: NTIS CSCL 22/3

The problem of using aerodynamic forces, or a combination of aerodynamic forces and propulsive force to effect orbital changes and other maneuvers of a low altitude orbiting vehicle is considered. The aerodynamic forces involved, which include both lift and drag, vary in magnitude from small compared with the gravitational force at the original orbit to very much larger than the gravitational force when the vehicle dips into the denser atmosphere for brief intervals. Separate Poisson series solutions in terms of a small parameter are obtained for the aerodynamically perturbed orbit at the original altitude, and the gravitationally perturbed trajectory in the denser portion of the skip. A directly matched asymptotic expansion for the two regimes is developed. This composite solution is checked against exact numerical integration with good results. GRA

N75-27056# Colorado Univ., Boulder. Dept. of Aerospace Engineering Sciences.

A STUDY OF VERY HIGH ALTITUDE MANEUVERS USING AERODYNAMIC FORCES. VOLUME 4: OPTIMUM MANEUVERS OF HYPERVELOCITY VEHICLES USING THRUST AND/OR AERODYNAMIC FORCE Final Report, 2 Jan. 1971 - 2 Jan. 1974

Adolf Busemann, Nguyen X. Vinh, and Robert D. Culp Sep. 1974 77 p refs

(Contract F33615-71-C-1103; AF Proj. 7071)

(AD-A004791; ARL-74-0104-Vol-4) Avail: NTIS CSCL 22/3

A lifting, thrusting vehicle operating at orbital speeds about a spherical planet is considered. The general problem posed is that of moving the vehicle from a given set of initial conditions to a given set of terminal conditions while minimizing the characteristic velocity of the maneuver. The maneuver is accomplished by a combination of thrust and aerodynamic force. The first problem solved is transfer from an initial circular orbit to a final non-coplanar circular orbit. Pure thrusting maneuvers are compared with combined thrust-aerodynamic maneuvers, with the optimal solutions given in closed form. GRA

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

N75-27057*# General Dynamics/Convair, San Diego, Calif.

SPACE TUG AVIONICS DEFINITION STUDY. VOLUME 1: EXECUTIVE SUMMARY Final Report, Jul. 1974 - Mar. 1975

Apr. 1975 48 p 5 Vol.

(Contract NAS8-31010)

(NASA-CR-120655; CASD-NAS-75-012-Vol-1) Avail: NTIS HC $3.75 CSCL 22B

A top down approach was used to identify, compile, and develop avionics functional requirements for all flight and ground operational phases. Such requirements as safety mission critical functions and criteria, minimum redundancy levels, software memory sizing, power for tug and payload, data transfer between payload, tug, shuttle, and ground were established. Those functional requirements that related to avionics support of a particular function were compiled together under that support function heading. This unique approach provided both organizational efficiency and traceability back to the applicable operational phase and event. Each functional requirement was then allocated to the appropriate subsystems and its particular characteristics were quantified. Author

N75-27058*# General Dynamics/Convair, San Diego, Calif.

SPACE TUG AVIONICS DEFINITION STUDY. VOLUME 2: AVIONICS FUNCTIONAL REQUIREMENTS Final Report, Jul. 1974 - Mar. 1975

Apr. 1975 43 p refs 5 Vol.

(Contract NAS8-31010)

(NASA-CR-120656; CASD-NAS-75-012-Vol-2) Avail: NTIS HC $3.75 CSCL 22B

Flight and ground operational phases of the tug/shuttle system are analyzed to determine the general avionics support functions that are needed during each of the mission phases and sub-phases. Each of these general support functions is then expanded into specific avionics system requirements, which are then allocated to the appropriate avionics subsystems. This process is then repeated at the next lower level of detail where these subsystem requirements are allocated to each of the major components that comprise a subsystem. Author

N75-27059*# General Dynamics/Convair, San Diego, Calif.

SPACE TUG AVIONICS DEFINITION STUDY. VOLUME 3: AVIONICS BASELINE CONFIGURATION DEFINITION Final Report, Jul. 1974 - Mar. 1975

Apr. 1975 111 p 5 Vol.

(Contract NAS8-31010)

(NASA-CR-120657; CASD-NAS-75-012-Vol-3) Avail: NTIS HC $5.25 CSCL 22B

The baseline avionics systems for the space tug is comprised of a central digital computer that integrates the functions of all of the tug's subsystems by means of a redundant digital data bus. The major subsystems of the avionics system are: data management; communications; guidance, navigation, and control; rendezvous and docking; electrical power; and instrumentation. The baseline avionics system for the space tug resulting from system and subsystem trade studies is defined. Tug interfaces with the spacecraft, orbiter and the ground, and the baseline philosophy and configuration for onboard checkout of the tug are included. Baseline configurations, functional and operational features, component details and characteristics, and the supporting software are included in the subsystem descriptions. Author

N75-27060*# General Dynamics/Convair, San Diego, Calif.

SPACE TUG AVIONICS DEFINITION STUDY. VOLUME 4: SUPPORTING TRADE STUDIES AND ANALYSES Final Report, Jul. 1974 - Mar. 1975

Apr. 1975 188 p 5 Vol.

(Contract NAS8-31010)

(NASA-CR-120658; CASD-NAS-75-012-Vol-4) Avail: NTIS HC $7.00 CSCL 22B

Analyses and trade studies were performed for the evaluation of the most desirable solutions to space tug subsystem requirements. These were accomplished at system, subsystem, and at component levels. The criteria, the candidate options evaluated, the selection process, and the recommended solutions that have been integrated together in the configuration descriptions are reported. Author

N75-27061*# General Dynamics/Convair, San Diego, Calif.

SPACE TUG AVIONICS DEFINITION STUDY. VOLUME 5: COST AND PROGRAMMATICS Final Report, Jul. 1974 - Mar. 1975

Apr. 1975 140 p 5 Vol.

(Contract NAS8-31010)

(NASA-CR-120659; CASD-NAS-75-012-Vol-5) Avail: NTIS HC $5.75 CSCL 22B

The baseline avionics system features a central digital computer that integrates the functions of all the space tug subsystems by means of a redundant digital data bus. The central computer consists of dual central processor units, dual input/output processors, and a fault tolerant memory, utilizing internal redundancy and error checking. Three electronically steerable phased arrays provide downlink transmission from any tug attitude directly to ground or via TDRS. Six laser gyros and six accelerometers in a dodecahedron configuration make up the inertial measurement unit. Both a scanning laser radar and a TV system, employing strobe lamps, are required as acquisition and docking sensors. Primary dc power at a nominal 28 volts is supplied from dual lightweight, thermally integrated fuel cells

which operate from propellant grade reactants out of the main tanks. Author

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N75-27062*# Parker-Hannifin Corp., Irvine, Calif. Air and Fuel Div.

ACTUATION AND SYSTEM DESIGN AND EVALUATION OMS ENGINE SHUTOFF VALVE, VOLUME 1 Final Report

V. B. Dunn May 1975 210 p

(Contract NAS9-13442)

(NASA-CR-141874; EER-5739000-Vol-1) Avail: NTIS HC $7.25 CSCL 21H

A technology program was conducted to identify and verify the optimum valve and actuation system concept for the Space Shuttle Orbit Maneuvering System engine. Of major importance to the valve and actuation system selection was the ten-year, 100-mission, 10,000-cycle life requirement, while maintaining high reliability, low leakage, and low weight. Valve and actuation system concepts were comparatively evaluated against past valve failure reports and potential failure modes due to the shuttle mission profile to aid in the selection of the most optimum concept for design, manufacture and verification testing. Two valve concepts were considered during the preliminary design stage; i.e., the moving seat and lifting ball. Two actuation systems were manufactured and tested. Test results demonstrate the viability of a lifting ball concept as well as the applicability of an ac motor actuation system to best meet the requirements of the shuttle mission. Author

N75-27063*# Parker-Hannifin Corp., Irvine, Calif. Air and Fuel Div.

ACTUATION AND SYSTEM DESIGN AND EVALUATION OMS ENGINE SHUTOFF VALVE, VOLUME 2 Final Report

V. B. Dunn May 1975 172 p

(Contract NAS9-13442)

(NASA-CR-141875; EER-5739000-Vol-2) Avail: NTIS HC $6.25 CSCL 21H

For abstract see, N75-27062.

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N75-27064 British Library Lending Div., Boston Spa (England).

THE SYNTHESIS, STRUCTURE AND PROPERTIES OF POLY-CONJUGATED SYSTEMS BASED ON COMPOUNDS OF THE ACETYLENE SERIES

M. I. Cherkashin Oct. 1974 9 p refs Transl. into ENGLISH from Dokl.-Vses Konf. po Khim. Atsetilena Alma-Ata (USSR), v. 3, 1972 p 89-96

(BLL-RTS-9354) Avail: British Library Lending Div., Boston Spa, Engl.: 3 BLL photocopy coupons

A study of the methods of obtaining and the complex nature of the properties of polyconjugated systems (PS) was conducted to extend and develop concepts concerning the role of the pi-bond in organic chemistry, and to obtain new classes of polymeric materials. Some results of the study of the principles of polymerization, modification, and structural features of PS based on derivatives of acetylene are generalized. Author

N75-27065 Wisconsin Univ., Madison.

ELECTROCATALYSIS AND ELECTROGENERATIVE HYDROGENATION Ph.D. Thesis

George Panayotis Sakellaropoulos 1974 492 p

Avail: Univ. Microfilms Order No. 75-9998

Kinetic, electrocatalytic, and transport processes were investigated for the electrogenerative reduction of organic compounds to determine limiting factors and principles controlling reaction selectivity. Theories of heterogeneous catalysis in porous media were extended to complex electrochemical reactions in partially wettable porous electrocatalysts. Electrogenerative hydrogenation of ethylene on both platinum and palladium proceeds with similar steps; the reaction rate is limited by the second hydrogen addition to an adsorbed ethyl radical. Liquid hydrocarbons were reduced in a horizontal cell with a cathode placed at the substrate-electrolyte interface. Electrocatalysis at the surface was the limiting process for hydrogenation of olefinic and aromatic hydrocarbons, although slow pore diffusion limited catalyst utilization at high current densities with the most active electrodes. Selectivity with respect to either hydrogen addition or halide cleavage in the reduction of organic halocompounds was studied over platinum, palladium, ruthenium, and silver porous electrodes as a function of cathode potential and nature of the halide. Electrogenerative hydrogenation of water-soluble substrates was explored, using several cell designs. Dissert. Abstr.

N75-27066 Maryland Univ., College Park.

LINEAR DYNAMICS OF THE HYDROGENOLYSES OF BUTANES IN AN ADIABATIC FIXED BED REACTOR Ph.D. Thesis

Frederick Harry Halvorsen 1974 214 p

Avail: Univ. Microfilms Order No. 75-15775

A dynamic mathematical model was formulated for the hydrogenolyses of normal butane and isobutane to lower molecular weight paraffins in an adiabatic-fixed bed reactor. The model differentiated between gas phase and solid phase temperature and considered inter-and intraphase resistances to heat and mass transfer. A mixing chamber was used to divide the reactor into two reaction zones of equal length. An approximately equal temperature increase occurred in each reaction zone and two-thirds of the primary reactant was converted over the length of the reactor. Finite differencing in space and Laplace transformation in time were used to formulate a matrix form which was numerically solved in the frequency domain to yield Bode plots for several uncontrolled and feed-forward - controlled cases. Dissert. Abstr.

N75-27067 Delaware Univ., Newark.

INVOLVEMENT OF FREE RADICALS IN THE CATALYTIC OXIDATION OF PHENOL IN AQUEOUS SOLUTION Ph.D. Thesis

Ajit Jaichand Sadana 1975 205 p

Avail: Univ. Microfilms Order No. 75-14974

Aqueous-phase catalytic oxidation of phenol over supported copper oxide was studied between 369-452 K and 14.7-250 psi oxygen pressure in batchwise mode. The reaction involves an induction period and a steady-state activity regime. The initial rate is first order in phenol and oxygen, and the steady-state rate constant is first order in phenol and one-half order in oxygen. Free radicals are involved in the heterogeneously-catalyzed aqueous-phase phenol oxidation. Free-radical involvement was established by free-radical inhibitor studies which show the same efficiencies as observed in homogeneous free-radical oxidation, and is supported by the presence of an induction period, by the observed reaction kinetics, and by pH studies. The involvement of a heterogeneous-homogeneous reaction mechanism is indicated by the dependence of reaction rate on catalyst and alumina concentration. Dissert. Abstr.

N75-27068# Technische Universitaet, Munich (West Germany).

STUDIES ON THE MECHANISMS AND PROPERTIES OF VINYL ACETYL CoA ISOMERASE AND ENOYL CoA HYDRATASE WITH COMPLETE CELLS AND ENZYME ENRICHMENTS OF CHLOSTRIDUIUM KLUYVERI Ph.D. Thesis [UNTERSUCHUNGEN UEBER MECHANISMUS UND EIGENSCHAFTEN DER VINYLACETYL-CoA ISOMERASE UND ENOLY-CoA-HYDRATASE MIT GANZEN ZELLEN UND ENZYMANREICHERUNGEN VON CLOSTRIDIUM KLUYVERI]

Erwin Schleicher 24 Oct. 1974 117 p refs In GERMAN

Avail: NTIS HC $5.25

Substrates, intermediate products, substrate analogs and possible inhibitors for the C.kluyveri enzymes vinyl acetyl CoA isomerase and enoyl CoA hydratase are studied. It is shown that C.kluyveri consists at least of two phyla, the ethanol acetate- and the crotonate-phylum, that exhibit different enzymatic activities in reactions with unsaturated fatty acids at various fermentation and hydration conditions. Transl. by G.G.

N75-27069# Paul Sabaiter Univ., Toulouse (France).
NUMERICAL CONTROL OF A PILOT UNIT OF CONTINUOUS FERMENTATION Ph.D. Thesis [CONDUITE NUMERIQUE D'UNE UNITE PILOTE DE FERMENTATION CONTINUE]
Jean Boudon 8 Jan. 1975 121 p refs In FRENCH
Avail: NTIS HC $5.25

A pilot unit for the continuous production of protein on methanol substrates, in view of numerical calculations and controls and optimization, was proposed. Data are cover biological fermentation and fermentation parameters, optimum environmental variables, and mathematical models of the process. Problems of control theory, stability, statistical optimization, and control models were studied and illustrated with the aid of numerical simulations. Transl. by E.H.W.

N75-27070# Helsinki Univ. of Technology, Otaniemi (Finland). Dept. of Chemistry.
THE CATALYTIC DIMERISATION OF TALL OIL FATTY ACIDS AND THE CHARACTERISATION OF THE PRODUCTS
Anneli Hase 1974 25 p refs
(ISBN-951-99037-1-2) Avail: NTIS HC $3.25

Finnish tall oil fatty acids were dimerized using acid catalysts. Best results were obtained using montmorillonite clay catalyst (Filtrol Grade 20). With this catalyst, 9-55 % monomer conversions and 0.25-1 selectivities of dimer formation were obtained, both varying with the amount of catalyst, reaction temperature and reaction time. The mechanism of dimerization is discussed, especially the catalytic reactions with the montmorillonite clay catalyst. The tall oil fatty acid dimerization products were characterised using various methods including gas-liquid chromatography and gel chromatography. The hydroxyl content of dimerization products was analyzed using acetylation methods and NMR spectrometry. The advantages and disadvantages of these techniques are discussed. Author

N75-27071*# Life Systems, Inc., Cleveland, Ohio.
EVALUATION AND CHARACTERIZATION OF THE METHANE-CARBON DIOXIDE DECOMPOSITION REACTION Final Report, 20 Jun. 1974 - 19 Jun. 1975
R. J. Davenport, F. H. Schubert, J. W. Shumar, and T. S. Steenson Jun. 1975 81 p refs
(Contract NAS8-30748)
(NASA-CR-143890; ER-207-3) Avail: NTIS HC $4.75 CSCL 07C

A program was conducted to evaluate and characterize the carbon dioxide-methane (CO2-CH4) decomposition reaction, i.e., CO2 + CH4 = 2C + 2H2O. The primary objective was to determine the feasibility of applying this reaction at low temperatures as a technique for recovering the oxygen (O2) remaining in the CO2 which exits mixed with CH4 from a Sabatier CO2 reduction subsystem (as part of an air revitalization system of a manned spacecraft). A test unit was designed, fabricated, and assembled for characterizing the performance of various catalysts for the reaction and ultraviolet activation of the CH4 and CO2. The reactor included in the test unit was designed to have sufficient capacity to evaluate catalyst charges of up to 76 g (0.17 lb). The test stand contained the necessary instrumentation and controls to obtain the data required to characterize the performance of the catalysts and sensitizers tested: flow control and measurement, temperature control and measurement, product and inlet gas analysis, and pressure measurement. A product assurance program was performed implementing the concepts of quality control and safety into the program effort. Author

N75-27072# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Automatique et d'Analyse des Systemes.
MODELIZATION AND OPTIMAL COMMAND AND CONTROL OF A FERMENTATION PILOT UNIT Ph.D. Thesis - Toulouse Univ. [MODELISATION ET CONDUITE NUMERIQUE OPTIMALE D'UNE UNITE PILOTE DE FERMENTATION]
Jean-Louis Lescourret 1974 156 p refs In FRENCH
(Contract DGRST-70-02-150)
Avail: NTIS HC $6.25

The modelization and optimal control of a pilot unit for gluconic acid discontinuous fermentation by pseudomonas fluorescence is presented. The physico-chemical operating conditions are specified together with the resulting concept for the pilot unit. The fermentation process was analyzed to establish a procedure for modelization and identification, and simple estimating models are discussed around the optimal criterion for nonmeasurable quantities. By computerized simulation the static optimal control was derived, and an attempt at numerical control is detailed. The actual method used for analog and numeric pH control and numeric biomass is presented. ESRO

N75-27073# Agricultural Research Service, Washington, D.C.
HIGH-MOLECULAR COMPOUNDS, SERIES B, VOLUME 13
1975 20 p refs Transl. into ENGLISH from Vysokomolekul. Soedin. (Moscow), v. 13, no. 1, 1971 4-5, v. 13, no. 6 p 426-427, v. 13, no. 8 p 621-624, v. 13, no. 10 p 708-709, and v. 14, no. 2, 1972 p 127-131 Sponsored in part by NSF (TT-74-58060) Avail: NTIS HC $3.25 CSCL 07C

Five articles concerning molecular structure and conformation of polyacrylates are presented. GRA

N75-27074# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AROMATIC COMPOUNDS WITH FLUORINE CONTAINING (SUBSTITUENTS)
Yu. A. Fyalkov and L. M. Yagupolskii 4 Dec. 1974 162 p refs Transl. into ENGLISH from the book "Sintezy Ftororganicheskikh Soedinenii" Moscow, Izd-vo Khimiya, 1973 p 215-312
(AD-A004628; FTD-HC-23-1372-74) Avail: NTIS CSCL 07/3

Synthetic methods for aromatic compounds with fluoro-containing substituents are described. Physical properties and methods of their derivations are also listed. A general discussion of basic fluorination and synthetic methods for these compounds is included. GRA

N75-27075# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AROMATIC COMPOUNDS CONTAINING FLUORINE ATOMS IN THE RING. ABSTRACT OF SYNTHETIC METHODS
I. L. Knunyants and G. G. Yakoboson 19 Dec. 1974 163 p refs Transl. into ENGLISH from the book "Sintezy Ftoroganicheskikh Soedinenii" USSR, 1973 p 86-124
(AD-A004511; FTD-HC-23-1371-74) Avail: NTIS CSCL 07/3

The syntheses of aromatic polyfluoro compounds are described in some detail. Physical characteristics and other methods of derivation are reported for each compound. The review is not exhaustive, but presents the principal methods of synthesis for each compound. Also included is a synopsis of the general synthetic reactions used to obtain fluoro aromatic compounds. GRA

24 COMPOSITE MATERIALS

Includes laminates.

N75-27076 Drexel Univ., Philadelphia, Pa.
DEFORMATION BEHAVIOR OF CONTINUOUS THERMOPLASTIC FIBER REINFORCED POLYPROPYLENE COMPOSITES Ph.D. Thesis
Melvin Roy Kantz 1975 165 p
Avail: Univ. Microfilms Order No. 75-14403

The strength and toughness characteristics of polypropylene reinforced with low volume fractions (0 - 0.10) of nylon 6-6 and Dacron polyester fibers were studied. Composite properties were investigated chiefly as functions of fiber volume fraction, adhesion between the phases, and fiber distribution. The role was delivered of the fiber-matrix interface for a composite system

in which, contrary to conventional composites, the Poisson ratio of the fiber is much greater than that of the matrix and the stiffness ratio (fiber to matrix) is less than five. Tensile stress-elongation data were collected using an Instron tester, and toughness was evaluated from double edge-notched tensile and notched Izod impact tests. The microstructure of deformed specimens was studied using optical and scanning electron microscopy. The tensile yield strength and fracture toughness of the thermoplastic composites increased markedly with fiber volume fraction whereas the elastic modulus remained nearly constant. Dissert. Abstr.

N75-27077 Virginia Polytechnic Inst. and State Univ., Blacksburg.
FATIGUE DAMAGE MECHANISMS IN FIBER REINFORCED COMPOSITE MATERIALS INCLUDING THE EFFECT OF CYCLIC LOADING FREQUENCY Ph.D. Thesis
Richard Scott Williams 1975 139 p
Avail: Univ. Microfilms Order No. 75-15887

Strain-controlled fatigue tests, a scanning electron microscopy study, energy emission techniques (such as acoustic and thermal emissions), and an energy-based failure theory, were used to characterize fatigue damage mechanisms in fiber reinforced composite materials. The effect of cyclic loading frequency on fatigue damage development is found to be substantial. A micromechanical damage model, which accounts for the effects of frequency and fiber/matrix interface strength, was developed. Using a first law analysis, a good correlation between acoustic and thermal emission with damage propagation and extent was also developed. A conceptual theory, called the strain energy release-potential theory, was postulated. Predictions based on this theory are made and compared with experimental findings. Dissert. Abstr.

N75-27078 California Inst. of Tech., Pasadena.
PROPERTIES OF SUPERCONDUCTING Cu-RICH COMPOSITES CONTAINING V3Si OR V3Ga Ph.D. Thesis
Wilkie Yung-Kee Chen 1975 164 p
Avail: Univ. Microfilms Order No. 75-9519

Superconducting Cu-rich composites containing the A-15 compounds V3Si or V3Ga were made by a process which consists of melting the constituent elements into ingots followed by subsequent cold working and heat treatment. The superconducting transition temperatures of the resulting composites were measured and X-ray diffraction analyses were performed to identify the phases in the alloys. The microstructures were studied using both the optical metallograph and the scanning electron-microscope. It was found that the process does not work for the composites containing V3Si, but works satisfactorily for the composites containing V3Ga. The relations between the measured properties and the various metallurgical factors such as the alloy compositions, the cross-section reduction ratios of the materials, and the heat treatment are discussed. The basic mechanism for the observed superconductivity in the materials is also discussed. Dissert. Abstr.

N75-27079 Drexel Univ., Philadelphia, Pa.
TENSILE AND IMPACT BEHAVIOR OF NICKEL-BASE COMPOSITE MATERIALS Ph.D. Thesis
Stephen Joseph Burden 1975 138 p
Avail: Univ. Microfilms Order No. 75-14401

The role of brittle interfacial intermetallic compounds in tensile and impact behavior was examined in nickel base composites reinforced with refractory metal wires. Mechanical properties were determined and behavior analyzed in light of the associated microstructures. Composite systems were examined with ductile or brittle fiber reinforcement by testing above and below the ductile to brittle transition temperature of the fibers. Tensile and impact behavior of unidirectionality reinforced nickel-molybdenum filamentary composites were studied at ambient temperature and -196 C(-320F). The tensile behavior of ductile fiber composites was found to follow the rule of mixtures if allowance was made for the reduction in volume fraction reinforcement due to interface reaction and for decreased fracture strain of the composite. The toughness of these composites decreased with increasing volume fraction reinforcement and the work of fracture due to interface break up was found to be a negligible part of the total fracture energy. Dissert. Abstr.

N75-27080# Illinois Inst. of Tech., Chicago. Dept. of Metallurgical and Materials Engineering.
IMPACT STRENGTH AND TOUGHNESS OF FIBER COMPOSITE MATERIALS
L. J. Broutman and P. Mallick Sep. 1974 64 p refs
(Grant AF-AFOSR-2214-72; AF Proj. 6813; AF Proj. 9782)
(AD-A004142; AFOSR-75-0051TR; TR-2) Avail: NTIS CSCL 11/4

The impact properties of laminated composites have been studied as a function of fiber orientation angle, lamination configuration and specimen geometry. The energy absorbing mechanisms have been identified. The damage done to the laminates after single and repeated impacts has been evaluated by residual strength and modulus measurements as well as vibration response measurements. GRA

N75-27081*# General Dynamics Corp., San Diego, Calif. Convair Div.
SPACE PROCESSING OF COMPOSITE MATERIALS Final Report
W. H. Steurer and S. Kaye 28 Feb. 1975 108 p refs
(Contract NAS8-29620)
(NASA-CR-143887; CASD-NAS-75-025) Avail: NTIS HC $5.25 CSCL 11D

Materials and processes for the testing of aluminum-base fiber and particle composites, and of metal foams under extended-time low-g conditions were investigated. A wetting and dispersion technique was developed, based on the theory that under the absence of a gas phase all solids are wetted by liquids. The process is characterized by a high vacuum environment and a high temperature cycle. Successful wetting and dispersion experiments were carried out with sapphire fibers, whiskers and particles, and with fibers of silicon carbide, pyrolytic graphite and tungsten. The developed process and facilities permit the preparation of a precomposite which serves as sample material for flight experiments. Low-g processing consists then merely in the uniform redistribution of the reinforcements during a melting cycle. For the preparation of metal foams, gas generation by means of a thermally decomposing compound was found most adaptable to flight experiments. For flight experiments, the use of compacted mixture of the component materials limits low-g processing to a simple melt cycle. Author

N75-27082*# Fisk Univ., Nashville, Tenn. Dept. of Physics.
OPTICAL EFFECT OF THE CONTAMINATION OF INFRARED WINDOWS BY THE OUTGASSING OF MATERIALS IN OUTER SPACE Semiannual Status Report, period ending 30 Jun. 1975
E. Silberman 30 Jun. 1975 11 p
(Grant NGR-43-021-002)
(NASA-CR-143174) Avail: NTIS HC $3.25

The products and kinetics of outgassing from S13G paint were studied by using infrared absorption measurements of the material outgassed (using an evaporation cell and vacuum chamber). Two separate long-term experimental depositions from heated samples of the S13G paint were made. Before each experiment, the vacuum chamber and sample holder were carefully cleaned and outgassed to ensure that subsequent deposits on the colled-window were due only to the products evaporated from the sample. Results of experiments are listed and discussed. Author

N75-27083# Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy and Materials Science.
ION ETCHING OF AMORPHOUS AND SEMICRYSTALLINE FIBERS
S. B. Warner, D. R. Uhlmann, and L. H. Peebles, Jr. Feb. 1975 27 p refs
(Contract N00014-67-A-0204-0065; NR Proj. 053-534)
(AD-A004659; TR-4) Avail: NTIS CSCL 14/2

Ion etching of amorphous and semicrystalline polymeric or graphite fibers produces structures which can be observed in either the transmission electron microscope or the scanning electron microscope. The structures so produced have previously been identified as resulting from the etching process (artifacts), or as representing characteristics of the material, or both. The artifacts can be eliminated or minimized by rotating the sample during irradiation, using a low angle of incidence, and ensuring

that the temperature of the sample surface remains low. When such precautions are used, amorphous fibers and semicrystalline fibers which are not oriented remain featureless after ion etching. Oriented semicrystalline fibers, however, develop a striated structure which is oriented perpendicular to the stretch direction. These transverse structural features reflect characteristic features of drawn fibers; but the relation between these features and the lamellar spacing is unclear. GRA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N75-27084 Yale Univ., New Haven, Conn.
A STUDY OF SURFACE DIFFUSION BY INTERNAL REFLECTION INFRARED SPECTROSCOPY Ph.D. Thesis
Chung-Zong Wan 1974 137 p
Avail: Univ. Microfilms Order No. 75-15382

The effects of co-adsorbed species on the rates of surface diffusion in binary systems were investigated thoroughly by the technique of internal reflection infrared spectroscopy. Three binary model systems were studied in this work; (a) stearic acid/water on (4150) surface of alpha-alumina, (b) stearic acid/isopropyl or methyl alcohol on (0001) or (4150) surface of alpha-alumina and (c) stearyl alcohol or 1-octadecylamine/water on (4150) surface of alpha-alumina. The rate of surface diffusion of stearic acid on alpha-alumina was found to be a function of co-adsorbed species (water or alcohols). The rate of diffusion is small at low coverages of co-adsorbed species, increases by two orders of magnitude and reaches a maximum as coverage approaches the vicinity of monolayer and then decreases rapidly as coverage is increased beyond monolayer. The diffusion of stearic acid on alpha-alumina on which co-adsorbate was adsorbed in multilayers is affected by the solubility of stearic acid in that co-adsorbed species. Dissert. Abstr.

N75-27085 Rensselaer Polytechnic Inst., Troy, N.Y.
AN INTEGRAL EQUATION METHOD FOR MODELING THE TRANSIENT BEHAVIOR OF CATALYTIC REACTIONS WITHIN POROUS PARTICLES Ph.D. Thesis
Joseph John Sangiovanni 1974 150 p
Avail: Univ. Microfilms Order No. 75-14948

An integral equation method to describe the transient behavior of catalytic reactions within porous particles subject to both internal and external transfer of heat and mass is presented. Using Green's function techniques, a set of simultaneous implicit integral equations was derived for temperatures and concentrations within a porous particle as functions of position and time for arbitrary initial conditions and any reaction kinetics. A direct numerical procedure was developed for low-order simple reaction kinetics (first or second order) with Arrhenius temperature dependence while, in theory, an iterative numerical procedure can be extended to higher order reactions involving any number of species. Agreement of transient predictions for typical combinations of dimensionless parameters at later times with corresponding steady state profiles serves to substantiate the validity of the integral equation method using the direct numerical procedure. Dissert. Abstr.

N75-27086 New Hampshire Univ., Durham.
GROWTH OF OXIDE PARTICLES IN FLAMES: A THEORETICAL AND EXPERIMENTAL STUDY OF SILICA FORMING FLAMES Ph.D. Thesis
Narayanan S. Subramanian 1975 93 p
Avail: Univ. Microfilms Order No. 75-14203

Silica particles were produced through the combustion of a premixed stream of silicon tetrachloride, propane, oxygen and nitrogen. Samples were collected at various positions above the flame front using a specially designed nitrogen quenched vacuum probe. The collected samples, after calcination, were analyzed by nitrogen adsorptograph and the electron microscope. The Brownian collision theory is modified to include the case of noninstantaneous coalescence. Aggregate formation is a part of the growth process and particles exist as aggregates throughout, rather than appearing only at the end of the process. The aggregate concentration, the number of primary particles per aggregate, and primary particle size were expressed as a function of a sticking coefficient, the initial particle radius, and the ratio of surface tension to viscosity. Theoretical surface area calculations are in good agreement with those measured experimentally at short and long residence times. Dissert. Abstr.

N75-27087 Maryland Univ., College Park.
MASS TRANSFER IN A LIQUID-GAS SPRAY COLUMN Ph.D. Thesis
William Edward Winter, Jr. 1974 158 p
Avail: Univ. Microfilms Order No. 75-14311

The removal of dilute concentrations of sulfur dioxide from an air stream by a water spray was investigated and mathematical models were developed to describe and predict the absorption of sulfur dioxide by the spray drops. Concentrations of sulfur dioxide averaged .33 percent in the column inlet and exit gas streams were measured with standard samples by a gas chromatograph. Liquid rates in the column varied, and the liquid-gas rate ratio was found to be the most important parameter affecting exit gas concentration. Mathematical models of the motion of spray drops through the column and of transfer coefficients of oscillating drops were used to estimate the height of a transfer unit within the column. Models representing the spray column as a series of mixing cells and based on SO2 absorption by a drop dispersion alone, as well as a drop dispersion along with a wetted column wall, were evaluated. Dissert. Abstr.

N75-27088 Kansas State Univ., Manhattan.
EXPERIMENTAL MEASUREMENT AND SIMULATION OF PACKED BED REACTOR PERFORMANCE IN THE PRESENCE OF CATALYST DEACTIVATION Ph.D. Thesis
Adrian Charles Snyder 1974 244 p
Avail: Univ. Microfilms Order No. 75-14383

A model and experiments to verify the behavior of an integral bed catalytic reactor experiencing catalyst deactivation is presented. The system chosen for study was the vapor-phase hydrogenation of nitrobenzene to aniline over a barium-promoted copper chromite catalyst. Determination of both the kinetic and deactivation rate models was based on experiments performed in a differential bed. By separating the deactivation and kinetic studies, the direct measurement of activity profiles at various times on stream for a nonisothermal integral bed reactor with constant wall temperature was accomplished. A one-dimensional, pseudo steady-state simulation of the reactor, incorporating reaction and decay rate models, was attempted. Incorporation of a product stabilization factor into the deactivation rate model was also found to be necessary. Dissert. Abstr.

N75-27089 Houston Univ., Tex.
IMPROVEMENT OF A THERMOKINETIC TECHNIQUE AND ITS APPLICATION TO METHANATION MECHANISM STUDIES Ph.D. Thesis
Robert Neal McGill 1974 143 p
Avail: Univ. Microfilms Order No. 75-13943

A detector was developed that will give representative thermal values even with strong zoning adsorption or reaction mechanisms. It can be used as a thermokinetic device, having an order of magnitude faster time response than the so called 'fast responding' thermal detectors. This improved thermal detector - termed a conduction, heat flow calorimeter - was applied to the study of the hydrogenation of carbon monoxide on a nickel catalyst. Based on the thermal results obtained, it was concluded that the initial hydrogenation of adsorbed carbon monoxide, due to an equilibrium limited hydrogen adsorption was a rate limiting step. At low temperatures (less than 200 C) the dehydration of a partially hydrogenated C-O-H complex was also rate limiting. Dissert. Abstr.

N75-27090 Washington Univ., St. Louis, Mo.
AN ELECTROLYTIC ANALOG TO TIME-DEPENDENT DIFFUSION IN STEADY POTENTIAL FLOW Ph.D. Thesis

Robert William Meier 1974 190 p
Avail: Univ. Microfilms Order No. 75-14930

A mathematical analogy between Fickian diffusion in a potential flow field and the migration of ions in an electrolytic solution subject to an electrostatis field was shown to exist. An experimental technique that exploits this analogy was developed, and consists of using, in a fluid at rest, a liquid pH indicator to determine time varying three-dimensional isopleths of concentration of hydrogen ions diffusing from a source in the presence of an electrostatic field. The analog was used to study experimentally transient diffusion from a point source at five different locations in a potential flow field with plane or wavy boundaries. Analytical solutions were obtained for transient diffusion from a point source with no boundary interaction and above any piecewise differentiable boundary in the presence of two-dimensional, steady, potential flow, and the analytical solution was applied to the cases studied experimentally. Dissert. Abstr.

N75-27091 Missouri Univ., Rolla.
A STUDY OF EXOTHERMIC CHEMICAL REACTION IN A POROUS CATALYST WEDGE Ph.D. Thesis
Joseph Michael Schardl 1974 145 p
Avail: Univ. Microfilms Order No. 75-15851

Temperature and composition were measured at various locations in a system where ethylene is hydrogenated to ethane on a 1/4 inch porous catalyst wedge made of nickel supported on alumina. When the wedge of catalyst was bathed in hydrogen, experimental results indicated a high temperature rise from the feed temperature to the catalyst which is implied by the diffusion controlled regime for solid catalyzed, highly exothermic reactions. This high activity was reversibly reduced by bathing the catalyst wedge in nitrogen for extended time periods (greater than 24 hours). This nitrogen soaking changed the experimental conditions from those of diffusion controlled kinetics to those typically exhibited by systems in the kinetic regime. The experimental system was simulated numerically for a variety of boundary conditions using reasonable assumptions and physical property data for this reaction system. Heat and mass transfer coefficients were allowed to vary along the wedge according to boundary layer theory results. Dissert. Abstr.

N75-27092 North Carolina Univ., Chapel Hill.
PREPARATION OF ACTIVATED ZINC METAL AND ITS REACTIONS WITH ORGANIC HALIDES IN PRESENCE OF VARIOUS LEWIS BASES Ph.D. Thesis
Sung Jin Uhm 1974 95 p
Avail: Univ. Microfilms Order No. 75-15712

Finely divided active zinc powder was prepared by the reduction of zinc salts with an alkali metal in an ethereal solvent. The interactions between the zinc metal surface and organic halides, as well as the reactions of the organozinc compounds formed, were studied by adding hard and soft ligands, both anionic and neutral, to the reaction mixture in an attempt to investigate their effects on the reactions. The direct reaction between the metal and the organic halides is catalyzed by bases. The catalytic effect appears higher with hard ligands than with soft ligands. The ligands effect on the organometallic reaction results in a variety of reactivities of the organometallic compounds. The stability of the deactivated complex affects the reaction, and a selected ligand can cause the reaction to proceed with a high yield. Activated tin metal and activated palladium on charcoal were also studied. Dissert. Abstr.

N75-27093 Maryland Univ., College Park.
SIMPLEX OPTIMIZATION OF THE SEPARATION OF PHOSPHOLIPIDS BY HIGH PRESSURE LIQUID CHROMATOGRAPHY AND QUANTITATIVE ANALYSIS USING A MOVING-WIRE DETECTOR Ph.D. Thesis
Mary Louise Rainey 1974 121 p
Avail: Univ. Microfilms Order No. 75-14310

The best solvent ratio for the separation of phosphatidylchlorine and sphingomyelin was found using a two-dimensional simplex capable of expansion and contraction. The method was extended to more complex mixtures of phospholipids and a separation of seven phospholipids was achieved using a 180-cm column packed with Corasil 2 and the solvent mixture chloroform-methanol-ammonia. A moving-wire detector was employed for the detection of phospholipids. The detection limits for the seven phospholipids under the conditions of separation were determined. The detection limits, defined as the amount of phospholipid giving a signal twice the noise level, were found. The sensitivity of the detector for the seven phospholipids defined as the slope of the calibration curve was shown to be approximately the same for all phospholipids. A mixture prepared from known concentrations of commercially obtained phospholipids was also analyzed.
Dissert. Abstr.

N75-27094 Missouri Univ., Columbia.
THE STABILITY OF MgHCO3(+) AND MgCO3 ION-PAIRS FROM 10 C TO 90 C Ph.D. Thesis
Robert M. Siebert 1974 117 p
Avail: Univ. Microfilms Order No. 75-16055

The dissociation constants of the MgHCO3(+) and MgCO3 ion-pairs were determined experimentally from 10 C to 90C at 15 deg intervals. For the MgHCO3(+) ion-pair, the experimental pH change between alternating additions of MgCl2 and KHCO3 to MgCl2 - KHCO3 solutions in equilibrium with CO2 was used to calculate the dissociation constants by a floating point method which does not require absolute pH and PCO2 values. The approach reduces the sources of error to single ion activity coefficients and reference electrode liquid-junction potentials. The 25 C result is in general agreement with several previous determinations; the pK variation as a function of temperature is in excellent agreement with that predicted by the Fuoss electrostatic ion-pair theory. Dissert. Abstr.

N75-27095 Yale Univ., New Haven, Conn.
EVAPORATION COEFFICIENTS OF POLAR AND RELATIVELY NON-POLAR LIQUIDS Ph.D. Thesis
Sandra Lee Lednovich 1974 132 p
Avail: Univ. Microfilms Order No. 75-15327

The coefficient for free evaporation was measured for glycerin, diethylene glycol, oleic acid and dibutyl phthalate as a function of temperature. The first two liquids were shown to be polar and formed strong intermolecular hydrogen bonds while oleic acid and dibutyl phthalate were relatively nonpolar in comparison. Evaporation coefficients for polar liquids are usually low, and since possible contamination effects have not been assessed, a method was devised which proved a high purity surface. The method adopted consisted in comparing the evaporative flux from a continually wiped liquid surface to the effusive flux out of a Knudsen cell from the same source area. The ratio of the fluxes is the evaporation coefficient. Results indicate that the free evaporation coefficients of freshly renewed liquid surfaces are much higher than those of static surfaces. Dissert. Abstr.

N75-27096 Washington Univ., Seattle.
MICROENCAPSULATION TO CONTROL ADSORPTION ON ACTIVATED CARBON Ph.D. Thesis
Wu-der No-Ree Huang 1974 320 p
Avail: Univ. Microfilms Order No. 75-14924

The synthesis of suitable polymers, their performance as flat membranes and microcapsule coatings, and the mathematical modeling of the adsorption behavior of the microcapsules are described. Acrylic acid/styrene and acrylic acid/acrylonitrile copolymers, containing fixed charges at physiological pH, were prepared. Flat membranes from AA-St copolymer have high permeability for the uremic wastes, such as urea, creatinine, but low permeability for organic acids. Flat membranes made from AA-AN copolymers are strong and tight in free acid form, but open when converted into alkali metal salts. A model for the adsorption kinetics of nonencapsulated activated carbon assumes a lumped diffusion driving force, with contributions from the gradients in both the pore liquid and in the adsorbed phase. Microcapsules with a negatively charged wall were prepared using AA-St and AA-An copolymers as the wall material. These microcapsules show a much slower rate of adsorption of anions, indicating a kinetically based adsorption selectivity. A higher capacity was obtained for creatinine in small gut fluid when activated carbon is encapsulated in such polymers.
Dissert. Abstr.

N75-27097# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
STUDY OF THE REAL GAS EFFECTS OF NITROGEN AND AIR AT HIGH DENSITIES AND TEMPERATURES Final

Report, Jul. 1972 - Sep. 1973
Georges P. Rouel and Bryan E. Richards Jan. 1975 81 p refs
(Grant AF-AFOSR-2413-72)
(AD-A004102; AEDC-TR-74-47) Avail: NTIS CSCL 07/4

A free piston compression tube has been used to generate samples of nitrogen and air test gases pressures up to 3000 kg/sq cm and 2300K. A description of the measurement of pressure, temperature and volume (driving part of the cycle) has been made. Calculations and experiments have been carried out which have indicated the level of uncertainty of measurement of these parameters. The results of the experiments in nitrogen have shown that agreement with the equation of state at low conditions is i.e. 1700K and 1400 kg/sq cm good, but a systematic deviation from that expected is obtained at higher conditions. The deviations from that expected from published tables describing the thermodynamic state of air are found to be large, but these may be due to a problem of contamination caused by the reactive nature of hot, high pressure oxygen. GRA

N75-27098# Eidgenossische Technische Hochschule, Zurich (Switzerland).
CONTRIBUTION TO THE CHARACTERIZATION OF METASTABLE IONS IN MASS SPECTROSCOPY Ph.D. Thesis [BEITRAG ZUR CHARAKTERISIERUNG VON METASTABILEN LONEN IN DER MASSENSPEKTROMETRIE]
Kurt A. Meier 1973 82 p refs In GERMAN
(Rept-5143) Avail: NTIS HC $4.75

Theoretical and mass spectrometric studies to determine the distribution functions of free kinetic energy in metastable ion decay are reported. A doubly focused mass spectrometer with multiplier tubes provides for better detection limits and less digital errors. Integration of the diagnosed signals improves isotope analysis and measurements on metastable transfers.
Transl. by G.G.

N75-27099*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EMISSION SPECTROMETRIC ARCING PROCEDURE WITH MINIMAL EFFECT OF CHEMICAL FORM OF SAMPLE
William A. Gordon Washington Jul. 1975 20 p refs
(NASA-TN-D-8005; E-8284) Avail: NTIS HC $3.25 CSCL 07D

Matrix effects related to the chemical form of analyzed materials were studied. An arc in argon was used which was buffered with silver chloride. The effect of chemical form was minimal for a variety of metals, oxides, and carbides representing the most refractory compounds and thermally stable metal-containing molecules. Only four of the most refractory materials known showed significant emission depressions due to incomplete volatilization in the arc system. These results are discussed in terms of vapor pressures of the solid materials placed on the anodes and dissociation reactions of the molecules in the gaseous environment. Author

N75-27100# Aeronautical Research Labs., Melbourne (Australia).
A SIMPLE TWO STAGE COMBUSTION SYSTEM FOR KEROSENE FUEL. PART 1: EVALUATION OF PERFORMANCE OF PRIMARY COMBUSTION STAGE INCLUDING EFFECT OF AIR PREHEAT
G. F. Pearce Aug. 1974 28 p refs
(ARL/ME-Note-352) Avail: NTIS HC $3.75

The primary combustion section of a two-staged system, based on a simple baffleswirler aerodynamic flow system, was evaluated over a wide range of air flows and fuel-air ratios, and with a limited amount of air preheat. Combustion efficiencies greater than 98% were obtained at the lower inlet temperature for all the operating conditions evaluated. When using 110 C of air preheat, the figure was increased to 99%. The results show that such systems are mixing-rate limited and that combustion intensities achieved are strongly dependent upon total pressure drop, but not greatly altered by increased inlet temperature. Author

N75-27101# Hamburg Univ. (West Germany).
MEASUREMENT OF CONDENSATION COEFFICIENTS WITH THE HELP OF QUANTITATIVE AUGER ELECTRON SPECTROSCOPY Ph.D. Thesis [MESSUNG VON KONDENSATIONSKOEFFIZIENTEN MIT HILFE DER QUANTITATIVEN AUGER-ELEKTRONENSPEKTROSKOPIE]
Rainer Anton 1974 82 p refs In GERMAN
Avail: NTIS HC $4.75

Auger electron spectroscopy is used to quantitatively determine crystal growth in vacuum deposited monolayers of gold on alkali halogenides, carbon or silicon oxide. Quantitative relations between relative Auger results for mass deposition and mass distribution of condensed materials on substrates are obtained by a combination of Auger measurements with electron microscopy and X-ray fluorescence analysis. Transl. by G.G.

N75-27102# Kiel Univ. (West Germany).
INTEFEROMETRIC MEASUREMENTS OF THE EIGEN PRESSURE WIDENING IN SPECTRAL LINES OF THE RARE GASES: HELIUM, NEON, ARGON, KRYPTON; IN THE REGION OF 10 TO 760 TORR Ph.D. Thesis [INTERFEROMETRISCHE MESSUNGEN DER EIGENDRUCKVERBREITERUNG VON SPEKTRALLINIEN DER EDELGASE He, Ne, Ar, Kr IM BEREICH 10-760 TORR]
Eggert Jung 1973 72 p refs In GERMAN
Avail: NTIS HC $4.25

Broadening in rare gas spectral lines is shown to depend linearly on gas pressure. Separation of broadening constants into purely resonant and those caused by higher interchange reactions confirm theoretical calculations on resonant line broadening.
Transl. by G.G.

N75-27103# Technische Universitaet, Hanover (West Germany).
SPECTRAL PHOTOMETRIC RESEARCH OF MELTED SALTS IN THE ALKALI METAL NITRATE-SILVER CHLORIDE SYSTEM Ph.D. Thesis [SPEKTRALPHOTOMETRISCHE UNTERSUCHUNGEN VON GESCHMOLZENEN SALZEN AM SYSTEM ALKALIMETALLNITRAT-SILBERCHLORID]
Helmut Rackur 1974 150 p refs In GERMAN
Avail: NTIS HC $5.75

Silver chloride melts are spectroscopic opaque in the ultraviolet and visible spectral regions, whereas alkali metal nitrates are transparent in the visible region with extinction and maximal absorption wavelength depending on temperature and melt composition. Thermal dissociation of alkali metal surface nitrate melts produces nitrite formation in response to experimental temperature if cations without pi bonding ability are present; cations with pi bonding ability produce oxide formation. Distribution studies on CoCl2 between KNO3- and AgCl-melts show that the distribution coefficients depends on molecular anion distribution.Spectroscopic studies determine a tetrahedral coordinated cobalt for the chloride phase, and octahedral cobalt coordination for the nitrate phase that changes slowly into the tetrahedron form with increasing chloride content.
Transl. by G.G.

N75-27104# Technische Universitaet, Munich (West Germany).
RESEARCH ON THE TEMPERATURE DEPENDENCE OF FLUORESCENT POLARIZATION OF ENZYMES IN AQUEOUS SOLUTIONS USING IMPROVED POLARIZATION GRADE APPARATUS Ph.D. Thesis [UNTERSUCHUNGEN UEBER DIE TEMPERATURABHAENGIGKEIT DER FLUORESZENZPOLARISATION EINIGER ENZYME IN WAESSRIGER LOESUNG MIT HILFE EINER VERBESSERTEN POLARISATIONSGRAD-APPARATUR]
Franz J. Hechenbichler 21 Jun. 1974 104 p refs In GERMAN
Avail: NTIS HC $5.25

An improved polarization spectrometer with lock-in amplifier for the vector voltmeter circuit is used to determine natural fluorescences of ribonuclease, alpha chymotrypsin and trypsin in aqueous solutions. Emphasized is the temperature dependence of the degree of polarization between 0 and 30 C and its effects on fluorescence duration and enzyme conformation changes. Results show that enzymes up to a molecular weight of about 30,000 exhibit measurable decreases in grades of polarization with increasing temperatures; life times of natural protein fluorescences were about 10 to the minus 9th power. Minor anomalies in velocity-temperature-diagrams of enzyme substrate reactions point to conformation changes inside the enzyme

molecule. These changes are already apparent in the isolated enzymes. Transl. by G.G.

N75-27105# Tokyo Univ. (Japan).
A COMPUTER PROGRAM FOR QUANTITATIVE ANALYSIS WITH ELECTRON PROBE X-RAY MICROANALYSER
Kazuo Masato May 1975 9 p refs Repr. from Inst. of Space and Aeron. Sci., Univ. of Tokyo Report 526, v. 40, no. 6, May 1975 p 179-189
(ISAS-526-Vol-40-No-6) Avail: NTIS HC $3.25

A computer program was presented for correction calculation in quantitative analysis with electron probe microanalyzer. The program determines the mass concentration of an analyzing element in a given sample from the relative intensity of characteristic X-ray of the element in a sample. The correction procedure includes the Philibert's absorption correction modified by Duncumb-Shields and Heinrich, the Castaing-Reed's fluorescence correction and the Bishop-Springer's atomic number correction modified by Duncumb, Shields-Mason and da Casa. The program does not include dead-time and background corrections. The output results of the program show not only calculated mass concentrations but also the factors of the absorption, the fluorescent excitation, the atomic number corrections, and other parameters. The program was used successfully for the analysis of Ti-Ni alloys. Author

N75-27106# California Univ., Berkeley. Lawrence Berkeley Lab.
FLUID FLOW PATTERNS AND SOLVENT SELECTION FOR LIQUID PHASE EPITAXIAL CRYSTAL GROWTH ON ROTATING CRYSTALS
P. S. Chen 11 Dec. 1974 90 p refs
(Contract W-7405-eng-48)
(LBL-2284) Avail: NTIS HC $4.75

Fluid flow conditions and thermochemical properties of solvent systems were studied for solution crystal growth in rotating systems. Fluid flow patterns were studied with time-lapse photography using the dye-tracer method for flow delineation. Simulation of solution crystal growth and Czochralski crystal growth revealed that the convection currents induced by crystal rotation in a stationary and slowly co-rotating crucible provided the best mixing conditions at the crystallization interface. The mixed solvent system PbO x (BaO x B2O3) sub 1-x was investigated theoretically and experimentally for conditions allowing congruent saturation of rare earth magnetic garnets and efficient liquid phase epitaxial growth. Author (NSA)

N75-27107# California Univ., Berkeley. Lawrence Berkeley Lab.
EFFECT OF POROUS BARRIERS ON THE MOLECULAR COMPOSITIONS OF REACTIVE GAS MIXTURES
P. Mohazzabi Feb. 1975 63 p refs
(Contract W-7405-eng-48)
(LBL-3565) Avail: NTIS HC $4.25

The effect of a porous barrier on the molecular composition of a gas mixture, when a pressure-dependent chemical reaction can take place among the components of the gas, is studied. Mass spectrometric studies on sodium chloride monomer-dimer reaction through porous alumina were employed to verify the predictions. NaCl and zinc showed the same transmission coefficient through a porous layer and indicates simple pore effusion is the only significant mode of transport through the porous barriers. The technique was used to reduce the ratio of dimer to monomer of lithium fluoride. The mass spectrometric fragmentation pattern of the monomer was then studied in order to re-examine a reported deviation from the mass spectrometric specificity rule for the monomer. NSA

N75-27108# Pennsylvania State Univ., University Park. Dept. of Materials Science.
ON THE NATURE OF ELECTROCHEMICAL REACTIONS AT A CRACK TIP DURING HYDROGEN CHARGING OF A METAL
B. G. Ateya and H. W. Pickering Jan. 1975 39 p refs
(Contract N00014-67-A-0385-0022)
(AD-A004464; TR-4) Avail: NTIS CSCL 07/4

The electrochemical conditions within cracks in metals during cathodic hydrogen charging are analyzed. The gradients of the electrical potential and concentrations of the various ionic species, and the current distribution are calculated for a model crack. The actual potential profiles were measured in slots in Fe, Ni, and Cu samples during hydrogen charging using an electrical potential probe. The measured potential drop in the electrolyte in the slots of all three metals is often very large, e.g., 0.5V. This is about an order of magnitude larger than that calculated, and is in general at odds with the usually implicit assumption that the electrode potential is not an important variable within a growing crack. The reason for this discrepancy is shown to be the large potential variation caused by the presence of trapped hydrogen gas bubbles in the slot. Tests of electrolyte samples taken from within slots while the current was flowing showed the presence of relatively large amounts of iron and nickel ions indicating that anodic dissolution of iron and nickel occurs within the slots, though not at the outer surface during cathodic hydrogen charging. GRA

N75-27109# Ohio State Univ., Columbus. Dept. of Chemistry.
SYNTHESIS AND PROPERTIES OF ROTAXANE COMPOUNDS Final Report, 1 Feb. 1972 - 30 Sep. 1974
Melvin S. Newman Jan. 1975 6 p
(Contract AF-AFOSR-2237-72; AF Proj. 9538)
(AD-A004518; OSURF-3377-F; AFOSR-75-0128TR; Rept-4) Avail: NTIS CSCL 07/3

Several approaches were tried for preparing arylacetylenes to be used in the synthesis of rotaxanes. The synthesis of 3,5-di-t-butylphenylacetylene in 41 percent yield was described in a communication which appeared in the Journal of Organic Chemistry. A new synthesis of benz(a) pyrine derivatives was worked out. This report gives a very brief analysis of this research. GRA

N75-27110# Naval Research Lab., Washington, D.C.
ARIS. AN AUTOMATIC RATE INTEGRATION SYSTEM Interim Report
K. Hain Jan. 1975 34 p ref
(NRL Proj. H02-27D)
(AD-A004630; NRL-MR-2966) Avail: NTIS CSCL 07/4

ARIS is a computer program written in FORTRAN, which uses the physical rate equations in the form A and B yields C and D to develop the corresponding differential equations. Temperature changes resulting from reactions are included, as well as external sources. The self-generated differential equations are inserted into an integration routine which is either a 3rd order predictor -- 4th order corrector method, or a 2nd order integration scheme particularly suited for stiff equations. The program provides output in the form of tables and graphs. GRA

N75-27111# Naval Postgraduate School, Monterey, Calif.
STOPPED-FLOW KINETICS OF THE AMMONATION OF cis-DICHLORODIAMMINEPALLADIUM 2 M.S. Thesis
Ross Gordon Hibler Dec. 1974 86 p refs
(AD-A004247) Avail: NTIS CSCL 07/4

Cis-dichlorodiamminepalladium(II) was synthesized and identified by its unique infrared spectrum. The reaction of cis-dichlorodiamminepalladium(II) with ammonia in varying concentrations of sodium chloride was studied using stopped-flow techniques. An analysis of the following system was completed and discussed in the light of experimental rate constants. Anomalies arising in the experimental results were discussed and recommendations for further work were made. GRA

N75-27112# Aerospace Corp., El Segundo, Calif.
A QUANTITATIVE GAS CALIBRATION TECHNIQUE FOR MASS SPECTROMETRY Interim Report
Donald E. Gilmartin and Camille A. Gaulin 7 Jan. 1975 23 p refs
(Contract F04701-74-C-0075)
(AD-A004836; TR-0075(9250-05)-1; SAMSO-TR-75-20) Avail: NTIS CSCL 07/4

A simple, direct quantitative gas calibration technique for mass spectrometry is described. This technique might be useful, in general, for mass spectrometers that do not incorporate a conventional calibrated gas inlet. Application for polymer chemistry and graphite offgassing is demonstrated. GRA

N75-27113# Aerospace Corp., El Segundo, Calif.
GASDYNAMIC CORRECTIONS APPLIED TO LASER-INDUCED FLUORESCENCE MEASUREMENTS OF HF (v=1) AND DF (v=1) DEACTIVATION
Jerry F. Bott 6 Jan. 1975 13 p refs
(Contract F04701-74-C-0075)
(AD-A004831; TR-0075(5530)-6) Avail: NTIS CSCL 07/4

Partial-pressure measurements in laser-induced fluorescence measurements were corrected for gas-dynamic effects. These corrections bring a number of HF (v=1) deactivation measurements into close agreements. GRA

N75-27114# Aerospace Corp., El Segundo, Calif. Lab. Operations.
CURVES OF GROWTH FOR ROTATIONAL LINES IN THE B SINGLET SIGMA (u)(+)-X SINGLET SIGMA(g)(+) SYSTEM OF MOLECULAR HYDROGEN Interim Report
John H. Birely, S. J. Young, Lane A. Darnton, Francis Hai, and Jerome V. V. Kasper 31 Dec. 1974 27 p refs
(Contract F04701-74-C-0075)
(AD-A004545; TR-0075(5270-20)-2; SAMSO-TR-75-4) Avail: NTIS CSCL 07/4

A calculational procedure is given for generating curves of growth for rotational lines in the B singlet Sigma(u)(+) - X singlet Sigma (g)(+) Lyman system of H2. Natural, collisional, and Doppler broadening have been taken into account. Results are given for the (0,0), (0,1), and (1,1) bands, and good agreement between experiment and theory has been demonstrated for several lines in the first of these features. GRA

N75-27115# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY OF THE KINETICS OF PHYSICOCHEMICAL PROCESS IN SHOCK TUBES
S. A. Losev 27 Nov. 1974 16 p refs Transl. into ENGLISH from the book "Gorenie i Vzryv" Moscow, Izd vo Nauka, 1972 p 672-678
(AD-A004401; FTD-MT-24-2009-74) Avail: NTIS CSCL 07/4

Experimental studies carried out with the aid of shock tubes made it possible to obtain much information about the kinetics of physicochemical processes in high-temperature gases. This survey proposes the examination only of some qualitatively new facts, established in experiments on shock tubes in recent years, and also a discussion of the question concerning which can be the basic paths of developing the kinetic studies of processes in shock tubes in the near future. The authors examine mainly the endothermal reactions with the participation of simple molecules. GRA

N75-27116# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OSCILLATORY ACTIVATION IN EXOTHERMIC REACTIONS OF DECOMPOSITION
S. M. Kogarko, E. V. Mozhukhin, and A. I. Demin 26 Nov. 1974 25 p refs Transl. into ENGLISH from the book "Gorenie i Vzryv" Moscow, Izd vo Nauka, 1972 p 685-689
(AD-A004685; FTD-MT-24-2011-74) Avail: NTIS CSCL 07/4

In the present work oscillatory inequilibrium during the thermal decomposition of hydrazoic acid and nitrous oxide was investigated. It has been experimentally established that in the process of decomposition occurs considerable oscillatory pumping of the initial molecule, which ensures energy feedback, and the reaction has the basic features of a chain process. GRA

N75-27117# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDIES OF THE KAZAN AERONAUTICS INSTITUTE-SCATTER INDICATRICES OF OXIDE PARTICLES IN COMBUSTION PRODUCTS
V. E. Alemasov and V. Ya. Klabukov 26 Nov. 1974 14 p refs Transl. into ENGLISH from Tr. Aviats. Inst. Kazan (USSR), no. 133, 1971 p 20-29
(AD-A004347; FTD-HC-23-1481-74) Avail: NTIS CSCL 07/4

It is necessary to know the angular distribution of scattered radiation (scatter indicatrix) when studying phenomena of energy transfer of thermal radiation in combustion products containing solid or liquid particles of condensed aluminum, magnesium, and other oxides, and also to know the absorption and scatter coefficients. The authors have developed an algorithm and program for calculating the scatter indicatrix on the M-20, M-220, and BESM-4 electronic computers, and have also conducted a corresponding calculation on the BESM-4 computer for a wide range of optical constants and particle dimensions. GRA

N75-27118# Southampton Univ. (England). Dept. of Chemistry.
STUDIES OF INFRARED CHEMILUMINESCENCE AND PHOTOELECTRON SPECTROSCOPY Interim Scientific Report, 1 Feb. 1972 - 30 Jun. 1973
Neville Jonathan Jan. 1974 16 p refs
(Grant AF-AFOSR-2276-72; AF Proj. 8658)
(AD-A003684; SR-2; AFCRL-TR-74-0526) Avail: NTIS CSCL 07/4

Progress regarding infrared chemiluminescence studies of simple atom-molecule reactions yielding hydrogen fluoride in vibrationally excited states is reviewed. Details of extension of the methods to include measurements of initial rotational energy level distributions are given. Particular reactions considered are those of atomic fluorine with hydrogen, hydrogen chloride and methane. An account is also given of the progress towards studying these reactions under conditions where the reactant is energetically excited. The progress of vacuum ultra violet photoelectron spectroscopy studies of transient species is also given. Studies include determination of ionic states of SO, CS, CH3, OH, O2 and CF2. GRA

N75-27119# Bureau of Mines, Reno, Nev. Metallurgy Research Center.
RECOVERY AND SEPARATION OF RARE-EARTHS ELEMENTS, BARIUM AND STRONTIUM FROM BASTNASITE WITH SULFURIC ACID Report of Investigations
J. A. Eiselle and D. J. Bauer Dec. 1974 15 p refs
(PB-240096; BM-RI-7990) Avail: NTIS HC $3.25 CSCL 07A

A bench-scale investigation of a concentrated H2SO4 reaction was conducted for the recovery and separation of rare earths, barium and strontium, from a bastnasite ore and by-product. Barium and strontium were dissolved in the concentrated acid and precipitated as a mixed product by water dilution. Separation of strontium and barium was affected by reaction with Na2CO3 solution followed by a dilute acid leach of the SrCO3 formed. The rare earths were roasted to water-soluble sulfates and the rare earth sulfate solution was processed by solvent extraction to produce rare earth oxides low in lead and magnesium. GRA

N75-27120# Bureau of Mines, Pittsburgh, Pa. Energy Research Center.
MASS SPECTROMETRIC ANALYSIS OF PRODUCT WATER FROM COAL GASIFICATION Technical Progress Report, 1973
C. E. Schmidt, A. G. Sharkey, Jr., and R. A. Friedel Dec. 1974 11 p refs
(PB-240835/9; BM-TPR-86) Avail: NTIS HC $3.25 CSCL 07D

Condensate waters from the Bureau of Mines SYNTHANE process for coal gasification were investigated by mass spectrometric methods to determine the organic contaminants. Waters from the gasification of six coals were extracted with methylene chloride, yielding 0.6 to 2.4 weight-percent extractable material. Using high resolution mass spectrometry, combined gas chromatography-mass spectrometry, and low-voltage mass spectrometry, 60 to 80 percent of the extract was found to be phenolic. About 20 organic contaminants were identified and are present in the condensate waters from each coal gasified. The relative distribution of contaminants in the condensate water was nearly the same for the six coals gasified under various conditions. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N75-27121 British Library Lending Div., Boston Spa (England).
THE EFFECT OF TECHNOLOGICAL FACTORS ON THE ELASTIC PROPERTIES OF INTERNALLY-OXIDIZED ALLOYS OF SILVER
T. V. Aksenova et al Dec. 1974 10 p Transl. into ENGLISH from Tr. Inst. Fiz. Met. Uralskii Fil., Akad. Nauk SSSR (USSR), v. 28, 1971 p 209-213
(BLL-RTS-9361) Avail: British Library Lending Div., Boston Spa., Engl.: 3 BLL photocopy coupons

The elastic properties of alloys of the Ag-Mg-Ni system are discussed. It is shown that strengthening by internal oxidation, in which Mg represents the strengthening element, which during high temperature heating forms oxides coherently associated with the matrix. It was established that the method of casting represents the decisive factor in obtaining a high level of elastic properties of the alloy being strengthening by internal oxidation. M.C.F.

N75-27122 British Library Lending Div., Boston Spa (England).
STUDY OF KINETICS OF INTERNAL OXIDATION OF SILVER AND PALLADIUM BASED ALLOYS CONTAINING ACTIVE ELEMENTS
V. P. Fedorenko Dec. 1974 8 p ref Transl. into ENGLISH from Trudy Inst. Fiz. Metal., Akad. Nauk SSSR, Ural Filial (USSR), v. 28, 1971 p 209-213
(BLL-RTS-9362) Avail: British Library Lending Div., Boston Spa., Engl.: £1.40; 2 BLL photocopy coupons

Data are reported which were obtained during the study of the kinetics of internal oxidation and, under these conditions, of the resulting strengthening (hardening) for the Pd and Ag based alloys containing the following active elements: Mg, Al, Ca, Ti, Cr, Zr, Cd, La, Ce, Hf (introduced into the alloy to the extent of 0.5 at.%), and for the alloys in the Ag-Pd-Mg system with a constant content of 3 weight % of Mg. Melting and casting of alloys were carried out in a furnace of type TTV-4 and in a long annular furnace in an atmosphere of pure helium. The study was conducted on specimens measuring 4.5 x 4.5 x 15 mm.
Author

N75-27123 British Library Lending Div., Boston Spa (England).
PRODUCTION AND PROPERTIES OF MAGNETIC ELECTROLYTIC COATINGS CONTAINING CHROMIUM
A. V. Baltushkin and L. F. Ilyushenka Jan. 1975 7 p refs Transl. into ENGLISH from Vestsi Akad. Nauk BSSR, Ser. Fiz.-Mat. Nauk (BSSR), v. 4, 1972 p 94-96
(BLL-RTS-9080) Avail: British Library Lending Div., Boston Spa, Engl.: £11.20; 2 BLL photocopy coupons

Literature on the subject of magnetic electrolytic coatings containing chromium is briefly discussed. Topics discussed include binary and ternary alloy coatings of iron group metals, the magnetic properties of coatings internal stresses, and the properties of Fe-Ni-Cr coatings. M.J.S.

N75-27124 British Library Lending Div., Boston Spa (England).
NITEMPERING OF STEEL AND CAST IRON
Cornelle H. Lulten [1974] 7 p Transl. into ENGLISH from Z. Wirtschaftliche Fertigung (West Germany), v. 68, no. 9, 1973 p 482-485
(BLL-M-23639-(5828.4F)) Avail: British Library Lending Div., Boston Spa., Engl.: 1 BLL photocopy coupon

Nitempering is discussed as a heat treatment process for steel and cast iron at 570 C., which takes place over a period of one to three hours - where appropriate for shorter or longer periods - in a mixture of 50% endogas and 50% ammonin. Following the treatment period, the material is either quenched with oil or cooled under recirculated protective gas. The process can be performed in standard sealed-quench units, which have been suitably adapted, or in special furnaces. A wear-resistant surface layer with excellent running characteristics and outstanding resistance to seizure during dry-running is obtained. Surface hardness and strength are increased and the life of the component is substantially extended. Typical experiences and results are described.
Author

N75-27125* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
BRAZING ALLOY BINDER Patent
Edward R. Roeder, inventor (to NASA) (Rockwell Intern. Corp., Canoga Park, Calif.) Issued 28 Oct. 1969 3 p Filed 8 Dec. 1965 Sponsored by NASA
(NASA-Case-XMF-05868; US-Patent-3,475,442; US-Patent-Appl-SN-512509; US-Patent-Class-260-29.6) Avail: US Patent Office CSCL 11F

A binder for brazing alloy compositions in powder form was designed to form an extrudable paste that can be easily used in extruding, that has a long shelf life, and that provides good brazing paste qualities. The binder is composed of polybutene, ethylene glycol, water, and acrylic solution. In addition to possessing good slump resistance at room temperature, the binder provides adhesion to metallic surface, alloy retention during the brazing cycle, and, when mixed with the alloy to form a paste, is permanently plastic. The binder is not reactive with the brazing alloys and most commonly used base metal materials.
Official Gazette of the U.S. Patent Office

N75-27126* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
BRAZING ALLOY COMPOSITION Patent
Edward R. Roeder (Rockwell Intern. Corp., Canoga Park, Calif.) and Ernst G. Huschke, Jr., inventors (to NASA) (Rockwell Intern. Corp., Canoga Park, Calif.) Issued 19 Nov. 1968 3 p Filed 13 Apr. 1966 Sponsored by NASA
(NASA-Case-XMF-06053; US-Patent-3,411,900; US-Patent-Appl-Sn-542192; US-Patent-Class-75-173) Avail: US Patent Office CSCL 11F

A silver-base brazing alloy containing palladium, copper, and nickel was developed to provide the following: good wetting capability of the base metal surfaces; no intergranular penetration or erosion of base metals; no stress cracking tendencies; joints with good resistance to crevice corrosion; and, good thermal conductivity. The brazing alloy is comprised of from 80 to 95 weight percent silver, from 1 to 10 weight percent copper, and from .5 to 3.5 weight percent nickel with trace amounts of impurities. The alloy may be prepared by commercial melting practices. Both wire and powder or prepared heats were used for evaluation of the material.
Official Gazette of the U.S. Patent Office

N75-27127* National Aeronautics and Space Administration. Pasadena Office, Calif.
BRAZING ALLOY Patent
Edward R. Roeder (Rockwell Intern. Corp., Canoga Park, Calif.) and Ernst G. Huschke, Jr., inventors (to NASA) (Rockwell Intern. Corp., Canoga Park, Calif.) Issued 12 Mar. 1968 2 p Filed 20 Sep. 1965 Sponsored by NASA
(NASA-Case-XNP-03878; US-Patent-3,373,016; US-Patent-Appl-SN-488745; US-Patent-Class-75-173) Avail: US Patent Office CSCL 11F

A brazing alloy was designed for use in manual applications (i.e. hand-held, manually operated torches). The brazing alloy contains zinc, copper, nickel, and silver, and provides both stress cracking resistance and corrosion resistance when applied to stainless steel base metal. The alloy may be prepared by conventional melt techniques.
Official Gazette of the U.S. Patent Office

N75-27128 University of Southern Calif., Los Angeles.
MAGNETIC PROPERTIES AND METALLURGICAL STRUCTURES OF SPLAT-COOLED RARE-EARTH COBALT COMPOUNDS Ph.D. Thesis
Ehsanollah Ziai 1974 152 p
Avail: Univ. Microfilms Order No. 75-15600

A materials processing technique suggested as an alternative to grinding in the production of high performance rare earth cobalt magnets is investigated. In this technique, described as liquid spraying and quenching, fine powders of RCo5 compounds are prepared without introducing the milling effect. Molten alloys are atomized into small liquid droplets and splat cooled on a copper substrate. Materials produced in this way have magnetic characteristics different from the powders prepared by the usual mechanical comminution. In particular, large increases of the intrinsic coercivities of PrCo5 and MMCo5 were observed. Optical and electron microscope examinations revealed that their microstructures were different from the as-cast materials. The grain sizes in the splat-cooled materials were observed to be extremely small. Moreover, because the materials were not ground,

the imperfections of the particles were greatly reduced.
Dissert. Abstr.

N75-27129 Missouri Univ., Rolla.
A FINITE ELEMENT METHOD FOR THREE-DIMENSIONAL ANALYSIS OF METAL FORMING Ph.D. Thesis
Nguyen Don Phu 1974 130 p
Avail: Univ. Microfilms Order No. 75-15845

The importance of metal forming by extrusion was reviewed, and a finite element approach was developed to analyze extrusion processes. A brick type linear element and the upper bound theorem were used to analyze the extrusion of a cylindrical billet into a square cross-section prism. A minimization technique for a nonlinear functional with linear constraints was developed. Different types of boundary conditions were also formulated. A frictionless extrusion was simulated using the computer program developed. Velocity profiles at different sections of the deforming solid were obtained and an average extrusion pressure was predicted for a given area reduction ratio. The effect of friction was investigated analytically. A brick type quadratic element (20 nodes) was tested successfully using the compression of a short cylinder as an example. Dissert. Abstr.

N75-27130 Michigan Technological Univ., Houghton.
THE SEGREGATION OF IMPURITIES TO GRAIN BOUNDARIES WITH SPECIAL REFERENCE TO SULFUR SEGREGATION IN NICKEL BASE ALLOYS Ph.D. Thesis
Calvin Lamont Wate 1974 133 p
Avail: Univ. Microfilms Order No. 75-14396

Grain boundaries and interphase boundaries in polycrystalline solids can exert great influence on a variety of important metallurgical properties. In many cases, these effects appear to be largely related to the chemistry of the interface in question. An examination was made of the desegregation of sulfur to grain boundaries in gamma prime nickel-aluminum and nickel-aluminum-titanium alloys. Auger electron spectroscopy, AES, is used to determine grain boundary chemistries of samples aged between 1000K and 1500K. Existing mathematical models for grain boundary segregation do not explain the temperature dependence of the observed sulfur segregation. The effective driving force for segregation appears to increase with temperature. This result is shown to be in qualitative agreement with other experimental results on sulfur segregation in iron and iron-tin alloys. The existing theories of grain boundary segregation are then re-examined from both a classical thermodynamic and statistical thermodynamic approach. Dissert. Abstr.

N75-27131 British Library Lending Div., Boston Spa (England).
DETERMINATION OF THE PHASES PRESENT IN TOOL STEELS QUENCHED FROM THE LIQUID STATE
T. Arai and N. Komatsu Aug. 1974 41 p refs Transl. into ENGLISH from Tetsu To Hagane (Japan), v. 58, no. 7, 1972 p 899-920
(BLL-RTS-8252) Avail: British Library Lending Div., Boston Spa, Engl.: 13 BLL photocopy coupons

The production of tool steels or tool alloys by powder metallurgical methods is reported as a means of improving their structure and enhancing their cutting capacity. It is shown that the reason why powder metallurgical methods have attracted such interest from research workers is that the tool steels produced by these methods have a fine carbide precipitate with a uniform distribution and should therefore have excellent tool steel properties. The quenched tool steels employed for the study are atomized powder, slat cooled materials, and materials termed by the author as 'locally quenched-solidified materials'. M.C.F.

N75-27132 British Library Lending Div., Boston Spa (England).
INVESTIGATION OF PHASE STRUCTURE OF ALLOYS OF THE TERNARY Ti-Al-Fe SYSTEM
M. A. Volkova and I. I. Kornilov Oct. 1974 9 p refs Transl. into ENGLISH from Khim. Metallicheskikh Splavov (Moscow), 1973 p 77-80
(BLL-RTS-9253) Avail: British Library Lending Div., Boston Spa, Engl.: £1.60; 3 BLL photocopy coupons

The effect of Fe and Al content on the phase composition of the ternary Ti-Al-Fe system was studied using thermal, microstructural, and X-ray analyses. Data results are used to construct polythermal sections. Author

N75-27133# Naval Research Lab., Washington, D.C.
MICROSTRUCTURE AND SWELLING OF FAST NEUTRON IRRADIATED TYPE 304 STAINLESS STEEL Interim Report
D. J. Michel, H. H. Smith, and J. T. Atwell 9 Dec. 1974 22 p refs
(NRL Proj. M01-27; RR0221141)
(AD-A003448; NRL-7820) Avail: NTIS CSCL 11/6

The effects of high-fluence, fast-neutron irradiation on the microstructure, swelling, and microhardness were evaluated for annealed Type 304 stainless steel that had attained fluences near 1.6 X 10 to the 23rd power n/sq cm = 0.1 MeV at irradiation temperatures from 370C to 470C (698F to 878F). Transmission electron microscopy was employed to characterize the radiation-induced void and defect structures. A maximum swelling of 10.4% was determined by immersion density measurements and independently confirmed from the microscopy data. Ambient temperature microhardness measurements were found to be in general agreement with calculated microhardness values based on the microscopy data. The calculations indicate that the radiation-induced voids were the primary microstructural component responsible for the measured microhardness. All results show the strong influence of the irradiation temperature and neutron fluence gradients experienced by the material during the EBR-II exposure. GRA

N75-27134# Eidgenossische Technische Hochschule, Zurich (Switzerland).
RESEARCH ON THE MECHANISM FOR CORROSION PROTECTION OF STEEL THROUGH ZINC DUST COATINGS Ph.D. Thesis [UNTERSUCHUNGEN UBER DEN MECHANISMUS DES KORROSIONSSCHUTZES VON STAHL DURCH ZINKSTAUBANSTRICHE]
Franz Theiler 1974 106 p refs In GERMAN
(Rept-4929) Avail: NTIS HC $5.25

Steel corrosion preventing effects of zinc dust primers, containing the bonding additives polystyrole, mixed vinyl polymers and chlorinated rubber, are evaluated under immersion conditions, in atmospheric exposure, and during fast weathering tests. Electrochemical determined critical pigment volume concentrations of bonding additives are found for maximal protection values.
Transl. by G.G.

N75-27135*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
GROWTH OF SURFACE AND CORNER CRACKS IN BETA-PROCESSED AND MILL-ANNEALED Ti-6Al-4V
Paul D. Bell Washington Jul. 1975 32 p refs
(NASA-TN-D-7922; L-8864) Avail: NTIS HC $3.75 CSCL 11F

Empirical stress-intensity expressions were developed to relate the growth of cracks from corner flaws to the growth of cracks from surface flaws. An experimental program using beta-processed Ti-6Al-4V verified these expressions for stress ratios, R greater than or equal to 0. An empirical crack growth-rate expression which included stress-ratio and stress-level effects was also developed. Cracks grew approximately 10 percent faster in transverse-grain material than in longitudinal-grain material and at approximately the same rate in longitudinal-grain mill-annealed Ti-6Al-4V. Specimens having surface and corner cracks and made of longitudinal-grain, beta-processed material were tested with block loads, and increasing the stresses in a block did not significantly change the crack growth rates. Truncation of the basic ascending stress sequence within a block caused more rapid crack growth, whereas both the descending and low-to-high stress sequences slowed crack growth. Author

N75-27136# Technische Hochschule, Darmstadt (West Germany).
MOSSBAUER-CONVERSIONS-SPECTROSCOPY MENTS OF TUNGSTEN (182) AND PROMETHIUM (145) Ph.D. Thesis [MOESSBAUER-KONVERSIONS-SPEKTROSKOPIE MESSUNGEN AN W-182 UND Pm-145]
Helmut Bokemeyer 20 Feb. 1973 80 p refs In GERMAN
Avail: NTIS HC $4.75

Mossbauer effect measurements for the 100.1 keV transition in W-182 established a number of compounds, some of which produced single line spectra and some fission spectra due to

quadrupole exchange. Measurements on 67 and 72 keV transition lines in Pm-145 were fitted to a single line spectrum; line width broadening of about 2.5 times was found. Transl. by G.G.

N75-27137*# Acoustic Emission Technology Corp., Sacramento, Calif.
ACOUSTIC EMISSION CHARACTERISTICS OF COPPER ALLOYS UNDER LOW-CYCLE FATIGUE CONDITIONS
Y. Krampfner (Calif. Univ., Los Angeles), A. Kawamoto (Calif. Univ., Los Angeles), Kanji Ono (Calif. Univ., Los Angeles), and A. Green Apr. 1975 116 p refs
(Contract NAS3-18904)
(NASA-CR-134766; UCLA-ENG-7529) Avail: NTIS HC $5.25 CSCL 11F

The acoustic emission (AE) characteristics of pure copper, zirconium-copper, and several copper alloys were determined to develop nondestructive evaluation schemes of thrust chambers through AE techniques. The AE counts rms voltages, frequency spectrum, and amplitude distribution analysis evaluated AE behavior under fatigue loading conditions. The results were interpreted with the evaluation of wave forms, crack propagation characteristics, as well as scanning electron fractographs of fatigue-tested samples. AE signals at the beginning of a fatigue test were produced by a sample of annealed alloys. A sample of zirconium-containing alloys annealed repeatedly after each fatigue loading cycle showed numerous surface cracks during the subsequent fatigue cycle, emitting strong-burst AE signals. Amplitude distribution analysis exhibits responses that are characteristic of certain types of AE signals. Author

N75-27138*# Case Western Reserve Univ., Cleveland, Ohio. Major Analytical Instruments Facility.
AN X-RAY PHOTOELECTRON SPECTROSCOPY STUDY OF NICKEL AND NICKEL-BASE ALLOY SURFACE ALTERATIONS IN SIMULATED HOT CORROSION CONDITIONS WITH EMPHASIS ON EVENTUAL APPLICATION TO TURBINE BLADE CORROSION Semiannual Report, Dec. 1974 - Jun. 1975
Gheorghe D. Mateescu Jul. 1975 48 p
(Grant NsG-3009)
(NASA-CR-143173; SAR-2) Avail: NTIS HC $3.75 CSCL 11F

The spectra of the pure metals tested and their oxides were used to analyze the patterns obtained for various superalloys. The quantitative results for two superalloys revealed differences between the surface compositions and their behavior under different conditions of oxidation. The following results occurred during the hot corrosion of samples in the presence of Na2So4: a lack of Ti migration; strong effects on Cr; and, a higher speed of alteration of superalloys. Author

N75-27139# Technische Universitaet, Munich (West Germany).
REACTIONS OF CHROMIUM (II) SURFACE BONDS WITH NITROGEN OXIDE, NITROGEN DIOXIDE, CHLORINE, BROMINE, HYDROGEN CHLORIDE, AND CARBON MONOXIDE Ph.D. Thesis [REAKTIONEN VON Cr(II)-OBERFLAECHEN-VERBINDUNGEN MIT NO, NO2, N2O, Cl2, Br2, HCl UND CO]
Berndt Weisser 4 Jun. 1974 109 p refs In GERMAN
Avail: NTIS HC $5.25

The conversion of unsaturated surface chromium (II) to silicagel by various potential ligands is studied with emphasis on reaction stoichiometry and type of ligand bonding. Considered are bonds with nitrogen oxide, nitrogen dioxide, chlorine, bromide, hydrogen chloride and carbon monoxide. Results show that surface Cr(II) has four free coordination points and that real stoichiometric reactions depend on the individual ligand; bonding of the ligand can be as donor or can show recessive characteristics. Reaction with HCl produced separation of the metal from the surface. Transl. by G.G.

N75-27140# Materials Research Labs., Maribyrnong (Australia).
SCALING EFFECTS IN THE NATURAL FRAGMENTATION OF AISI 9260 STEEL CYLINDERS
B. E. Walsh and A. J. Bedford May 1975 10 p refs
(MRL-628) Avail: NTIS HC $3.25

Experiments designed to investigate the effects of increasing the size of steel cylinders on their fragmentation behavior were carried out using medium-carbon steel (CS1050) in both the annealed and the hardened and tempered conditions. Another steel (AISI 9260) which is in general, more finely fragmenting than the CS1050 steel was also investigated. In these experiments, the cylinders were of constant wall thickness but of increasing diameter, which results in an increasing high-explosive charge-weight to cylinder-weight ratio (C/M) and in an increasing expansion velocity. As with other steels, a linear relationship between fragmentation parameter and C/M was found. Variations in microstructure due to different heat-treatments have an effect on the fragmentation behavior and on the slope of the relationship between fragmentation parameter and C/M ratio. Author

N75-27141# Materials Research Labs., Maribyrnong (Australia).
SCALING EFFECTS IN THE NATURAL FRAGMENTATION OF MEDIUM CARBON STEEL CYLINDERS
B. E. Walsh and A. J. Bedford Feb. 1975 27 p refs
(MRL-622) Avail: NTIS HC $3.75

The variation in the natural fragmentation of steel cylinders with changing cylinder dimensions (diameter, wall thickness and C/M ratio) was investigated using medium-carbon steels in different microstructural conditions. When all cylinder dimensions are increased proportionately so that their expansion velocities at breakup remain constant, the fragment mass distribution of the cylinders becomes coarser in direct proportion to the cylinder weight for each of the microstructural conditions tested. For cylinders of constant wall thickness but increasing diameter (which results in an increasing expansion velocity), a linear relationship exists between the fragmentation, expressed by the Modified Payman parameter and its expansion velocity at breakup. Variations in microstructure due to differences in heat treatment or composition have a marked effect on the slope of the relationship. Author

N75-27142# Materials Research Labs., Maribyrnong (Australia).
SCALING OF FRAGMENTATION
A. J. Bedford Mar. 1975 50 p refs
(MRL-624) Avail: NTIS HC $3.75

Fragmentation scaling relationships are formalized and further developed in order to describe the fragmentation of cylinders of varying sizes, and to be able to use this information for prediction of fragmentation from other size cylinders. Mott and Payman fragment mass distribution analyses are considered, and the Mott and Gurney-Sarmousakis scaling laws relating the Mott fragmentation parameter to cylinder dimensions are discussed. Laws relating the Payman fragmentation parameter to cylinder size are also discussed as are those relating a modified Payman parameter to cylinder size. The concepts of weight and number scaling were examined and detailed development of these concepts is carried out. It is demonstrated that scaling relationships can be chosen to systematically and quantitatively describe scaling of fragmentation. Author

N75-27143# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Materials Engineering.
PITTING AND STRESS CORROSION CRACKING BEHAVIOR OF AUSTENITIC STAINLESS STEEL WELDMENTS CONTAINING RETAINED FERRITE Progress Report, 1 Jun. 1974 - 31 May 1975
D. J. Duquette and W. F. Savage 1975 7 p refs
(Contract AT(11-1)-2462)
(COO-2462-1) Avail: NTIS HC $3.25

Pitting experiments on duplex stainless steel weld metal in 1N NaCl showed pit initiation resistance to be improved over that of unwelded austenitic steel. Pit growth was shown to be seriously accelerated in the duplex materials. Pit initiation in the duplex materials was associated with the austenite/ferrite interface, and growth was shown to occur as subsurface cavities rather than the hemispherical type of pitting associated with single phase austenite. Slow-strain-rate stress-corrosion cracking tests of single phase and duplex (welded) stainless steels were conducted in boiling 35 to 42% NaCl. In the single-phase material, intergranular crack initiation and transgranular cracking were observed. In all-weld-metal samples, cracking was confined to the austenite/ferrite interface at all temperatures. In specimens with a single transverse weld, it was observed that below

135 C, cracking occurred in the weld metal but that at 154 C, cracking was confined to the base alloy. Author (NSA)

N75-27144# Rensselaer Polytechnic Inst., Troy, N.Y.
FATIGUE OF VANADIUM Annual Report
N. Stoloff 15 Jan. 1975 26 p refs
(Contract AT(11-1)-3459)
(COO-3459-7) Avail: NTIS HC $3.75

The tensile and fatigue behavior of unalloyed 99.8% vanadium and two vanadium-hydrogen alloys containing vanadium hydride particles were determined at room temperature. In addition, tensile properties of high purity 99.95% vanadium was determined between 77 and 300 K. The S-N data obtained from stress controlled fatigue tests revealed a pronounced improvement in fatigue life for hydrided vanadium. Accompanying increased life was a pronounced change from striated fracture surfaces for unalloyed vanadium to cleavage for the hydrided material. Strain control tests were run to establish Coffin-Manson plots and generate cyclic hardening data for the three 99.8% vanadium materials. Results are discussed in conjunction with metallographic and fractographic observations. Author (NSA)

N75-27145# Reactor Centrum Nederland, Petten.
FATIGUE CRACK PROPAGATION OF TYPE 304 STAINLESS STEEL (DIN 1.4948) AT ROOM TEMPERATURE AND 550 C
M. I. DeVries and H. V. Staal Jan. 1975 24 p refs
(RCN-222) Avail: ERDA Depository Libraries HC $4.25

Fatigue crack growth rates were measured on stainless steel type 304 (DIN 1.4948) at room temperature and 550 C in air. Central crack specimens were tested under uniaxial tension. Tests were performed on a closed loop electro-hydraulic Instron 1251 Universal Testing Machine, in the load control mode. The investigations involved optical measurement of macroscopic fatigue crack propagation, metallographic examination of the microstructure of the material, examination of surface cracking by means of scanning electron microscopy and fractography by means of replica techniques. It was found that macroscopic crack growth rates related to the crack tip stress intensity range obeyed the power law relationship of Paris and Erdogan. Macroscopic crack growth rates at 550 C were higher than at room temperature. Striation spacing measurements are correlated with the stress intensity range for specimens tested at room temperature. Author (NSA)

N75-27146# Princeton Univ., N.J.
STUDY OF HYDROGEN PERMEATION THROUGH METALS Ph.D. Thesis
C. W. Kuehler Dec. 1974 196 p refs
(Contract AT(11-1)-3028)
(COO-3028-13) Avail: NTIS HC $7.00

The processes are studied that determine the rate of passage of gas composed of homonuclear diatomic molecules through a metal membrane into a gas phase of lower pressure. A detailed examination of the available literature revealed that at low temperatures, low driving pressures, and for very thin membranes the permeation rate exhibits anomalies not predicted by a theory based on diffusion as the rate-limiting step. Two basic theoretical models were examined in an attempt to describe quantitatively these anomalies. In the first model the rate processes of dissociative chemisorption, penetration of chemisorbed atoms into the surface, diffusion of atoms through the bulk metal, penetration of atoms out of the surface, and recombinative desorption were considered. In the second model the presence of a defective oxide film on the surfaces of the metal was postulated. NSA

N75-27147# California Univ., Berkeley. Lawrence Berkeley Lab.
FUNDAMENTAL CONSIDERATIONS IN THE DESIGN OF FERROUS ALLOYS
V. F. Zackay Feb. 1975 37 p refs Presented at the 40th Meeting of the Struct. and Mater. Panel, Brussels, 14 Apr. 1975
(Contract W-7405-eng-48)
(LBL-3595; Conf-750407-1) Avail: NTIS HC $5.75

For ferrous alloys, there is information on the relations between microstructure and fracture toughness. The relations were established by experiment, but they are in accord with theories of defects in solids and of linear elastic fracture mechanics. This state of affairs is probably a consequence of the significant advancements that were made in fields relevant to alloy design. Mention is made of high resolution electron optical instrumentation for the identification and characterization of the elements of microstructure and of the standardization and perfection of the techniques for the quantitative measurements of the fracture toughness of solids. One major problem now confronting the designer of alloys is that of producing alloys having microstructures with the desirable microconstituents and without the undesirable ones. Its solutions require knowledge of the interactions of elements in metallic solids as they influence the thermodynamics, kinetics, and phase transformations of solids. NSA

N75-27148# Naval Intelligence Support Center, Washington, D.C. Translation Div.
THE EFFECT OF THERMOPHYSICAL PROPERTIES ON THE NATURE OF THE WELDING OF CERTAIN METALS BY LASER RADIATION
A. A. Balatskii and M. S. Barabov 15 Nov. 1974 10 p refs Transl. into ENGLISH from Fiz. Khim. Obrabotki Materialov (USSR), no. 4, 1973 p 8-13
(AD-A004340; NISC-Trans-3608) Avail: NTIS CSCL 11/6

The relationship of penetration depth and diameter to radiation parameters and thermophysical properties was determined for a number of metals, e.g., nickel, kovar, constantan, and molybdenum. GRA

N75-27149# Naval Intelligence Support Center, Washington, D.C. Translation Div.
OPERATION OF AUTOMATIC ANTICORROSION DEVICES
V. M. Levin, V. A. Lomanovich, and M. V. Tarnizhevskii 23 Oct. 1974 130 p refs Transl. into ENGLISH from the monograph "Ekspluatatsiya Avtomaticheskikh Protivo-Korrozionnykh Vstroistv" Moscow, 1972 p 3-151
(AD-A004339; NISC-Trans-3593) Avail: NTIS CSCL 11/6

The book considers the protection of metallic underground structures from corrosion, as well as the operation of highly effective protection systems. A brief description is presented of existing automatic anticorrosion devices. Special attention is paid to the description of basic circuit components of these devices. Problems of maintenance, adjustment, and testing of protective units and of the individual subassemblies of these units are analyzed in detail. Also included are servicing methods of automatic electrodraining systems and cathode stations. GRA

N75-27150# Connecticut Univ., Storrs. Dept. of Metallurgy.
LIFETIME PREDICTION METHODS FOR ELEVATED TEMPERATURE Interim Report
A. J. McEvily and S. R. Crosby Apr. 1974 19 p Presented at the 38th Meeting of the Struct. and Mater. Panel, Washington, D. C., 21-26 Apr. 1974
(Grant AF-AFOSR-2703-74; AF Proj. 6813; AF Proj. 9782)
(AD-A004819; AFOSR-75-0155TR; AGARD-CP-155) Avail: NTIS CSCL 11/6

This paper reviews recently developed methods for metal lifetime prediction at elevated temperatures. These methods can be categorized as either (a) Parametric, (b) Damage Summation, (c) Strainrange Partitioning, or (d) Frequency Modification. The capabilities and limitations of these various approaches are discussed and the problem of extrapolation beyond laboratory experience is considered. GRA

N75-27151# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STRUCTURE AND PROPERTIES OF ALLOYS WHICH HAVE BEEN TREATED BY LASER RADIATION
M. A. Krishtal, A. A. Zhukov, and A. N. Kokora 26 Nov. 1974 296 p refs Transl. into ENGLISH of the book "Struktura i Svoistva Splavov, Obrabotannykh Izlucheniem Lazera," 1973 192 p
(AD-A004509; FTD-HC-23-1262-74) Avail: NTIS CSCL 11/6

The results of the original investigations of iron-carbon alloys within the laser radiation zone are presented. The nature of the interaction between the laser radiation and the material is examined. The special aspects of heating and cooling of metals and alloys associated with the use of laser radiation are clarified. Changes are demonstrated in the structure, composition and

properties of steel and cast iron under the influence of laser impulses obtained under various operating conditions. GRA

N75-27152# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OXIDATION RESISTANCE OF ALLOYS OF COMPOUND TiAl WITH NIOBIUM AT 800 DEGREES AND 1000 DEGREES C
I. A. Zelenkov 9 Dec. 1974 12 p refs Transl. into ENGLISH from Metallofizika (USSR), no. 42, 1972 p 63-66
(AD-A004445; FTD-MT-24-2689-74) Avail: NTIS CSCL 11/6

The effect of Ti or Al atom replacement by Nb on the oxidation resistance of TiAl was studied. It was found that the concentration of niobium from 5 to 10 at.% does not change the microhardness, nor the depth to which gases penetrate the alloy. F.O.S.

N75-27153# Belfour Stulen, Inc., Traverse City, Mich.
[INPUT AND OUTPUT FILE MAINTENANCE, SYSTEMS DEVELOPMENT, AND MARKETING-SALES FOR MECHANICAL PROPERTIES DATA ACQUISITION SYSTEM] Annual Report, 16 Sep. 1973 - 15 Sep. 1974
Robert C. Braden Dec. 1974 33 p refs
(Contract DSA900-74-C-1770)
(AD-A003999; AMMRC-CRT-74-70; AR-12) Avail: NTIS CSCL 11/6

This report reviews and discusses the continuing operation and development of the Mechanical Properties Data Center. Activity and growth of the Center are discussed in terms of the six major work areas: Input, File Maintenance, Output, Systems Development, Management and Marketing-Sales. GRA

N75-27154# United Aircraft Corp., East Hartford, Conn. Research Labs.
EUTECTIC ALLOY OPTIMIZATION PROGRAM Final Report, 18 Jan. - 19 Oct. 1974
E. H. Kraft Dec. 1974 59 p refs
(Contract N62269-74-C-0321)
(AD-A004266; UARL-N911824-3) Avail: NTIS CSCL 11/6

The development of a eutectic alloy composed of two ductile phases has proceeded. Cobalt additions to the gamma-alpha (Ni-37 w/o Cr-18 w/o W-0.1 w/o Al) eutectic improved phase alignment and increased strength at both room and elevated temperatures. No effect of cobalt on phase equilibria was observed. The gamma phase was substantiated as face centered cubic (FCC), while the crystallography of the alpha phase remained uncertain. Improvement of 73C eutectics in stability in thermal cyclic environments was sought by alloying and study of the mechanism of damage. Additions of aluminum, iron and nickel stabilized the FCC structure of the cobalt matrix of 73C eutectics, thus increasing stability in thermal cycling environments. Carbide size and volume fraction also had an influence on thermal cyclic stability, but their contribution was found to be less important than carbide perfection. GRA

N75-27155# Naval Ship Research and Development Center, Annapolis, Md.
STRESS RELIEF HEAT TREATMENT OF MANGANESE-NICKEL-ALUMINUM BRONZE AND MANGANESE-BRONZE WELDMENTS
Charles A. Zanis Jan. 1975 26 p refs
(AD-A004578; NSRDC-4447) Avail: NTIS CSCL 11/6

Tensile properties, weldability, general corrosion, and corrosion-fatigue properties were determined as a function of stress-relief heat treatment for both cast Mn-Ni-Al bronze and manganese-bronze propeller alloys. It was found that Mn-Ni-Al bronze is susceptible to stress-corrosion cracking in the as-welded heat-affected zone. Stress-relief heat treatments in the range of 700 to 1200F were effective in eliminating the stress-corrosion cracking in this alloy. Manganese-bronze weldments exhibited poor weldability but were not found susceptible to stress-corrosion cracking. High-cycle corrosion-fatigue tests on weldments revealed an endurance strength at 10 to the 8th power cycles of 12,000 pounds per square inch for Mn-Ni-Al bronze and 7,500 to 11,000 pounds per square inch for manganese bronze. GRA

N75-27156# Bureau of Mines, Rolla, Mo. Metallurgy Research Center.
THE EFFECT OF IMPURITIES AND ADDITIVES ON THE ELECTROWINNING OF ZINC Report of Investigations
H. H. Fukubayshi, T. J. OKeefe, and W. C. Clinton Dec. 1974 32 p refs
(PB-240143; BM-RI-7966) Avail: NTIS HC $3.75 CSCL 11F

The effect was investigated of various impurities, commonly found in zinc, electrowinning solutions, on the surface morphology, crystal orientation, and current efficiency of deposited zinc. Individual additions of the impurities (Al, Ag, Cd, Co, Cr, Cu, Ge, Mn, Ni, Sb, Sn, Ti, Pb02, PbS04, and HCl) were studied. Animal glue, gum arabic, and Na2SiO3 were also used individually or in combination, to determine their effect on the crystallization and current efficiency. The deposit surface was examined by a scanning electron microscope; an X-ray spectrometer was also used to locate impurity concentrations on the Zn deposit when pitting or re-solution occurred. Two mechanisms were proposed in the reduction of current efficiency: reduction of H(+) in codeposited impurities with low hydrogen overpotentials combined with localized cell corrosion, and continuous codeposition and evolution of H on Zn without preferential areas of Zn corrosion. The Ag, Cd, Cu, and Ni are classified under the former, and Ge, Sb, and Sn under the latter. Author

N75-27157# Bureau of Mines, Albany, Oreg. Metallurgy Research Center.
THERMODYNAMIC PROPERTIES OF THE Al-Ni SYSTEM Report of Investigations
Seth C. Schaeffer Dec. 1974 20 p refs
(PB-240092; BM-RI-7993) Avail: NTIS HC $3.25 CSCL 11F

The thermodynamic properties of Al-Ni alloys containing 0.54 to 30.04 atomic percent nickel were investigated with the aid of a high-temperature galvanic cell employing a fused salt electrolyte. Activities of aluminum and nickel (referring to pure liquid metals) show a pronounced negative deviation from Raoult's law at 1,273 K. Partial and integral thermodynamic properties for the Al-Ni system are tabulated and illustrated. At 1,127 K the thermodynamic stability for the invariant three phase equilibrium consisting of a saturated liquid, Al3Ni, and Al3Ni2, was uniquely defined by an activity of aluminum of 0.751. A free energy of formation at 1,127 K of minus 7,940 cal/g-atom was derived for the compound Al3Ni. Author

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N75-27158 British Library Lending Div., Boston Spa (England).
MACROMOLECULAR SIZE AND LATTICE STRUCTURE IN CROSS-LINKED POLYURETHANES
V. P. Privalko and Yu. S. Lipatov Jan. 1975 8 p refs Transl. into ENGLISH from Vysokomol. Soedin. (USSR), v. 12B, no. 4, 1970 p 268-272
(BLL-RTS-9588) Avail: British Library Lending Div., Boston Spa, Engl., £1.40; 2 BLL photocopy coupons

A study was conducted of the temperature dependence of the durability of cross-linked polymers based on simple and complex polyesters. It was shown that formal interpretation of the results obtained according to Bueche's theory (which adduces an agreement between the sizes of the macromolecules of polyurethanes in an ideal solvent and in the condensed, amorphous state) does not account for the features of the real structure of the lattice in polyurethane elastomers. It was also shown that the thermodynamic flexibility of the macromolecules of polyurethanes based on complex polyesters is higher than that of polyurethanes based on simple polyesters. Author

N75-27159 British Library Lending Div., Boston Spa (England).
A STUDY OF THE SPECTRAL SENSITIVITIES OF LIGHT-SENSITIVE POLYMERS
G. L. Gaeva Dec. 1974 5 p Transl. into ENGLISH of "Spektrosensitom Inykh Polimerov", Paper E19 Mezh. Kongress po Fotograficheskoi Nauke, Moscow, Jul.-Aug. 1970

p 157-160
(BLL-RTS-9071; E19) Avail: British Library Lending Div., Boston Spa, Engl.: £0.80; 1 BLL photocopy coupon

More than fifty individual organic compounds were tested as possible sensitizers of polyvinylcinnamate. It was found that by incorporating up to 10% (by weight) of sensitizer in a layer of polyvinylcinnamate, the overall light sensitivity could be increased. This was explained by the polymer becoming sensitive in the adsorption band of the sensitizer and the appearance of an additional maximum in the spectral sensitivity curve of polyvinylcinnamate. Results of spectral measurements and measurements of sensitization are listed. Author

N75-27160* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
REFRACTORY PORCELAIN ENAMEL PASSIVE CONTROL COATING FOR HIGH TEMPERATURE ALLOYS Patent
Herman Levin (Hughes Aircraft Co., Culver City, Calif.), Byron H. Auker (Hughes Aircraft Co., Culver City, Calif), and Michael N. Gardos, inventors (to NASA) (Hughes Aircraft Co., Culver City, Calif.) Issued 24 Jun. 1975 5 p Filed 11 Apr. 1973 Supersedes N73-21471 (11 - 12, p 1416) Sponsored by NASA
(NASA-Case-MFS-22324-1; US-Patent-3,891,452; US-Patent-Appl-SN-350250; US-Patent-Class-106-48; US-Patent-Class-106-54; US-Patent-Class-117-129) Avail: US Patent Office CSCL 11C

Porcelain enamel for use as a thermal control coating on high-temperature, nonferrous superalloy substrates is described. It is made up of a high-refractory-content boroaluminum silicate glass frit containing zirconium oxide, lithium fluoride, alkali metal and alkaline earth oxide-flux, zinc oxide, and a submicron disperse phase of cubic-stabilized zirconium oxide. The coatings exhibit favorable optical properties and a high coefficient of thermal expansion, providing compatibility with substrates of nonferrous superalloys and enabling coated parts of such alloys to withstand severe thermal cycling conditions without cracking.
Official Gazette of the U.S. Patent Office

N75-27161 Maryland Univ., College Park.
SELECTED ELECTRONIC PROPERTIES OF GRAPHITE Ph.D. Thesis
Rodney O. Dillon 1974 164 p
Avail: Univ. Microfilms Order No. 75-15772

The effect of a band parameter on the components of a magnetoconductivity tensor and an experiment which measures Shubnikov-De Haas oscillations in neutron-irradiated graphite are discussed. The out-of-plane overlap parameter in the band theory of Slonczewski and Weiss is the cause of a three-fold warping of the Fermi surface about the vertical edges of the Brillouin zone. This trigonal warping is used in determining the conductivity of graphite. The Shubnikov-De Haas effect refers to an oscillatory component in magnetoresistance; an oscillation occurs each time a quantized energy level (Landau level) is coincident with the Fermi energy. The field-shift of the oscillation positions as a function of neutron irradiation was studied. Dissert. Abstr.

N75-27162 Yale Univ., New Haven, Conn.
REDUCED DISTRIBUTION FUNCTIONS AND THE DYNAMICS OF STIFF POLYMER CHAINS Ph.D. Thesis
Jeffrey Dean Kovac 1974 111 p
Avail: NTIS Avail: Univ. Microfilms Order No. 75-15321

The configurational diffusion equation for polymer dynamics is formulated in terms of bond vector coordinates. A hierarchy of equations for reduced distribution functions which describe the diffusion of a small number of chain segments is derived. This hierarchy of equations was used to study the effects of local chain stiffness in polymer dynamics. The first, or singlet, equation in the heirarchy was applied to a chain model with rigid bonds and Gaussian pair correlations between these bonds. This model exhibits Rouse-Zimm behavior at low frequencies but has a nonzero limiting viscosity at infinite frequency. The problem of constrained coordinates for polymer chain models is discussed in some detail. The second, or pair, equation in the reduced distribution function hierarchy was used to describe the motions of freely jointed chains of two and three bonds. Approximate numerical solutions for the distribution functions and instrinsic viscosities are presented. Dissert. Abstr.

N75-27163 Washington Univ., Seattle.
CONTROLLED CRACK PROPAGATION IN POLYMERS Ph.D. Thesis
Webster Weiping Kiang 1974 245 p
Avail: Univ. Microfilms Order No. 75-14926

A time-dependent fracture criterion was developed for slow crack propagation by performing experiments unbiased by the preconceived material model. An experimental technique which combines the use of a small digital computer, a closed-loop electro-hydraulic testing machine, and a specially designed crack transducer was developed. These components are interfaced to form an integrated system whereby the crack length is measured and crack propagation velocity is controlled. The observed steady state crack propagation data was assessed by comparing it with data from available literature. A slow crack growth model was then formulated from the steady state information. This formulated model both demonstrated the ability to predict non steady state crack propagation by dynamic loading. Fracture surface were examined as a function steady state crack speed. It was observed that there exist two transitions or the roughness of a fracture surface instead of one, which is commonly observed on fracture surfaces of uncontrolled testings. Secondary crack growth was not observed within the experimental range of crack propagation speeds. Dissert. Abstr.

N75-27164*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ORGANOPOLYSILOXANE-BONDED GRAPHITE FLUORIDE AS A SOLID LUBRICANT
Robert L. Fusaro Washington Jul. 1975 21 p refs
(NASA-TN-D-8033; E-8298) Avail: NTIS HC $3.25 CSCL 11H

A study was conducted on the lubricating properties of organopolysiloxane-bonded graphite fluoride (CF sub 1.1) sub n films. The effects of temperature, atmosphere, composition of organopolysiloxane, and burnishing additional (CF sub 1.1) sub n powder onto the film surface were studied. For comparison, similar experiments were conducted on organopolysiloxane-bonded MoS2 films. The results are equivalent for both films, except that in a moist air environment the wear lives of the films formulated with (CF sub 1.1) sub n are up to 10 times longer than the wear lives of the MoS2-formulated films. Comparison to other (CF sub 1.1) sub n films showed organopolysiloxane films to give better lubrication results than hand-burnished (CF sub 1.1) sub n films but not as good as polyimide-bonded (CF sub 1.1) sub n films. Author

N75-27165# Technische Universitaet, Hanover (West Germany).
ESR: RESEARCH ON GERMANIUM DIOXIDE Ph.D. Thesis [ESR: UNTERSUCHUNGEN AN GERMANIUMDIOXID]
Wolfram Juretko 10 May 1974 126 p refs In GERMAN
Avail: NTIS HC $5.75

Electron spin resonance studies on ultrapure hexagonal germanium dioxide in an ultrahigh vacuum are used to determine surface catalytic activities. Ultraviolet irradiation triggers thermal activation of oxide vacancies and produces an ESR signal attributed to paramagnetic oxygen O2(-) chemisorbed onto the surface. These oxygen species act as electron attachment points.
Transl. by G.G.

N75-27166# Materials Research Labs., Maribyrnong (Australia).
UNDERWATER MARINE COATINGS ELIMINATION REACTIONS OF TRIBUTYLTIN OMEGA-CHLOROALKANOATES
G. Bocksteiner, G. Glew, and A. T. Phillip Nov. 1974 23 p refs
(MRL-615) Avail: NTIS HC $3.25

The copolymerization of tributyltin acrylate with vinyl chloride leads to an elimination of tributyltin chloride and the formation of a linear polymer containing a disubstituted butyrolactone moiety in the polymer chain. This reaction was investigated by preparing model compounds such as the tributyltin omega-chloroalkanoates (C4H9)3 SNOCO(CH2) sub n Cl (I, n = 1-4), as well as the tributyltin esters of dichloro- and trichloroacetic acid. Ready elimination of tributyltin chloride occurs at room temperature from tributyltin 4-chlorobutyrate (I, n = 3), which is converted to butyrolactone. At higher temperatures (140 C), tributyltin 3-chloropropionate (I, n = 2) also forms tributyltin chloride with

accompanying formation of a copolymer containing carboxyl groups and tributyltin oxycarbonyl groups. Tributyltin chloroacetate (I, n = 1) appears to be thermally stable at 140 C, since no chemical change was observed in this compound. Author

N75-27167# Sandia Labs., Albuquerque, N.Mex.
ADHESIVE PROPERTIES OF URETHANE RESIN
N. J. DeLollis 1975 11 p refs Presented at Spring Meeting of SAMPE, San Diego, Calif., 15 Apr. 1975
(SAND-74-5541; Conf-750412-1) Avail: NTIS HC $3.25

The report describes the adhesive and bulk properties of a polyol-cured methylene diphenyl diisocyanate (MDI) urethane resin system being evaluated as a replacement for a MOCA-cured urethane resin system. To verify that the adhesive aging studies do describe interfacial rather than bulk phenomena, shear moduli of the bulk resin system were studied with and without aging. The adhesive strength properties were evaluated at room temperature with and without aging at 74 C and at constant high humidity with thermal cycling. The durability of the bond is evaluated with and without the addition of an epoxy terminated silane primer. The adhesive strength properties with and without the primer are essentially the same for unaged specimens. Those specimens bonded with the urethane resin to which the primer is added show improvement in bond strength compared to the nonprimed urethane when exposed to both thermal and humidity aging. The bulk properties did not change under these conditions. Author (NSA)

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N75-27168# Stanford Research Inst., Menlo Park, Calif.
MATERIALS REQUIREMENTS FOR ADVANCED ENERGY SYSTEMS: NEW FUELS. VOLUME 3: MATERIALS RESEARCH NEEDS IN ADVANCED ENERGY SYSTEMS USING NEW FUELS Final Report, 1 May 1973 - 31 Jul. 1974
N. H. G. Daniels, B. C. Syrett, and R. L. Jones Jul. 1974 11 p refs 3 Vol.
(Contract DAHC15-73-C-0313; ARPA Order 2484; SRI Proj. PYU-2580)
(AD-A004550) Avail: NTIS CSCL 21/4

This program sought to identify materials-critical aspects of the use, production, transportation, and storage of new fuels derived from nonfossil sources. Hydrogen was the principal new fuel studied; hydrogen-derived fuels considered were ammonia, hydrazine, boranes, silanes, carbon monoxide, and methyl alcohol. The materials implications of the use of oxygen (produced as a by-product in hydrogen generation) as a fuel oxidizer and of the use of active metals in batteries were also examined. Volumes 1 and 2 are not available for public release. GRA

N75-27169*# Aerojet Solid Propulsion Co., Sacramento, Calif.
STUDY OF THE THERMAL DEGRADATION MECHANISM OF A COMPOSITE PROPELLANT Final Report
W. G. Schmidt May 1975 34 p refs Prepared for JPL
(Contracts NAS7-100; JPL-953865)
(NASA-CR-143142; Rept-1196-81F) Avail: NTIS HC $3.75 CSCL 21I

The current experimental program was designed to systematically investigate the role of the oxidizer in the thermal degradation process of composite propellants. The scanning electron microscope (SEM) was used to examine the failure sites in thermally degraded propellant samples. The formulation variables tested were oxidizer purity, oxidizer particle size, and oxidizer to binder bonding agent. The binder, a saturated hydrocarbon, was kept constant throughout the experiments. The oxidizers were: AP, chlorate-doped AP, arsenate-doped AP, and phosphate-doped AP. The oxidizer particle size distribution was 60% of the large fraction and 40% of the small fraction. The bonding agent, when present, was used at the 0.15% level. The data showed that both the oxidizer purity and particle size had an important affect on the thermal degradation process. The affect of the oxidizer particle size was more noticeable at the higher temperature and stress levels. An examination of the failure site, by SEM, of propellants subject to these latter conditions indicated that the fracturing of the large oxidizer particles led to the propellant cracking. Author

N75-27170# Naval Intelligence Support Center, Washington, D.C. Translation Div.
A SHORT HANDBOOK ON FUELS
K. F. Kushnirenko 23 Oct. 1974 86 p Transl. into ENGLISH from the monograph "Kratkii Spravochnik po Goryuchemu" Moscow, 1973 p 14-63, 108-126, 239-260
(AD-A004358; NISC-Trans-3594) Avail: NTIS CSCL 21/4

Fuels, lubricants, and special fluids are briefly discussed. The properties, composition, the location of deposits, and the methods of extracting and refining petroleum for use in gasoline and motor oils are presented. Antifreezes, antifriction lubricants, protective lubricants, and fuel storage are also discussed. L.B.

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N75-27171 Kansas State Univ., Manhattan.
ANALYSIS AND SYNTHESIS OF SOLIDS MIXING AND DEMIXING SYSTEMS Ph.D. Thesis
Fang Shyong Lai 1974 359 p
Avail: Univ. Microfilms Order No. 75-14367

A neutron activation tracer technique was applied to powder mixing and powder transport studies. This method used the radioisotope Mn-56 which was created by neutron activation. A discrete steady state Markov chain model was proposed to characterize the mixing process in a multicomponent homogeneous particle system. The model predicts the concentration distribution and the degree of mixedness of a multicomponent homogeneous particle system blended by passing the particles through a motionless mixer. The basic characteristics of diffusion and convection were modeled and simulated on a computer along with the concepts of coordination number and contact number of a mixture. The degree of mixedness based on these concepts was defined. The processes of forming striated and checkered pattern mixtures from particulate solids were considered. Four possible classes of mixtures were classified according to the packing arrangements and patterns of the mixtures. General relations for the mean contact number and the subdivision ratio for various packing arrangements in both RR- and RI-mixtures were found. Dissert. Abstr.

N75-27172# Helsinki Univ. of Technology, Otaniemi (Finland). Dept. of Technical Physics.
AN EXPERIMENTAL INVESTIGATION ON THE SUPERFLUIDITY OF He-3 Ph.D. Thesis
T. A. Alvesalo 1974 9 p refs
Avail: NTIS HC $3.25

The possible existence of superfluidity in the A- and B-phases of liquid He-3 at the melting curve was investigated. After a thermodynamic study of the nature of the A-transition, the first clear indications of superfluidity in the two phases were observed as drastic changes in the damping of a vibrating wire viscometer at the A- and B-transitions. Then, with improved resolution, the comparison of viscosity data in the normal Fermi-liquid region and the A- and B-phases showed that viscous flow in He-3 is accompained by a flow of zero viscosity. Author

N75-27173*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROCEEDINGS OF THE SIXTH ANNUAL PRECISE TIME AND TIME INTERVAL (PTTI) PLANNING MEETING
1974 574 p refs Conf. held at NRL, 3-5 Dec. 1974; Sponsored in part by Naval Electronic Systems Command and Naval Observatory Submitted for publication
(NASA-TM-X-70922; X-814-75-117) Avail: NTIS HC $13.00 CSCL 20J

Time and frequency measurements are described for navigation and reference systems. Time measuring instruments and experiments performed are discussed. For individual titles, see N75-27174 through N75-27204.

N75-27174* Naval Observatory, Washington, D.C.
PRECISE TIME AND TIME INTERVAL (PTTI), AN OVERVIEW **c35**
Gernot M. R. Winkler *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 1-15 (For availability see N75-27173 18-31)
CSCL 20J

Present applications of precise time and frequency (T/F) technology can be grouped as follows: (1) Communications systems which require T/F for time division multiplexing and for using spread spectrum techniques. (2) Navigation systems which need T/F for position fixing using a timed signal. (3) Scientific-Metrological applications which use T/F as the most precisely reproducible standard of measurement. (4) Astronomical-Space applications which cover a variety of the most demanding applications such as pulsar research, Very Long Baseline Interferometry (VLBI) and laser/radar ranging. In particular, pulsar time-of-arrival measurements require submicrosecond precision over a period of one-half year referred to an extraterrestrial inertial system, and constitute the most stringent requirements for uniform timekeeping to date. Author

N75-27175* Bureau International de l'Heure, Paris (France).
REVIEW OF TIME SCALES **c35**
B. Guinot *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 17-26 refs (For availability see N75-27173 18-31)
CSCL 20J

The basic time scales are presented: International Atomic Time, Universal Time, and Universal Time (Coordinated). These scales must be maintained in order to satisfy specific requirements. It is shown how they are obtained and made available at a very high level of precision. Author

N75-27176* Naval Observatory, Washington, D.C.
REVIEW OF AVAILABLE SYNCHRONIZATION AND TIME DISTRIBUTION TECHNIQUES **c35**
R. G. Hall, T. N. Lieberman (Naval Electronic Systems Command, Washington, D. C.), and R. R. Stone (Naval Res. Lab., Washington, D. C.) *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 29-37 (For availability see N75-27173 18-31)
CSCL 17B

The methods of synchronizing precision clocks will be reviewed placing particular attention to the simpler techniques, their accuracies, and the approximate cost of equipment. The more exotic methods of synchronization are discussed in lesser detail. The synchronization techniques that will be covered will include satellite dissemination, communication and navigation transmissions via VLF, LF, HF, UHF and microwave as well as commercial and armed forces television. Portable clock trips will also be discussed. Author

N75-27177* National Bureau of Standards, Boulder, Colo.
APPLICATIONS OF PTTI TO NEW TECHNIQUES FOR DETERMINING CRUSTAL MOVEMENTS, POLAR MOTION, AND THE ROTATION OF THE EARTH **c46**
P. L. Bender (Colorado Univ., Boulder) *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 39-57 refs (For availability see N75-27173 18-31)
CSCL 08G

New extra-terrestrial techniques are discussed for geodesy and geodynamics include laser range measurements to the moon or to artificial satellites, Doppler measurements with the Transit satellite system, and both independent-clock and linked-antenna microwave interferometry. The ways in which PTTI measurements are used in these techniques will be reviewed, and the accuracies expected during the latter half of the 1970's will be discussed. At least 3 of the techniques appear capable of giving accuracies of 5 cm or better in each coordinate for many points on the earth's surface, and comparable accuracies for the earth's rotation and polar motion. For fixed stations or for sites a few hundred km apart, baseline lengths accurate to 1 cm may be achieved. Ways in which the complementary aspects of the different techniques can be exploited will be discussed, as well as how they tie in with improved ground techniques for determining crustal movements. Some recent results from the extra-terrestrial methods will be mentioned. Author

N75-27178* National Bureau of Standards, Boulder, Colo.
A REVIEW OF PRECISION OSCILLATORS **c33**
Helmut Hellwig *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 59-81 refs (For availability see N75-27173 18-31)
CSCL 14B

Precision oscillators used in PTTI applications include quartz crystal, rubidium gas cell, cesium beam, and hydrogen maser oscillators. A general characterization and comparison of these devices is given including accuracy, stability, environmental sensitivity, size, weight, power consumption, availability and cost. Areas of special concern in practical applications are identified and a projection of future performance specifications is given. An attempt is made to predict physical and performance characteristics of new designs potentially available in the near future. Author

N75-27179* Aerospace Guidance and Metrology Center, Newark Air Force Station, Ohio.
TIME MEASUREMENT TECHNIQUES **c35**
J. F. Barnaba *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 83-89 (For availability see N75-27173 18-31)
CSCL 17G

The common time measurements as used by the U.S. Air Force Measurements and Standards Laboratory, Aerospace Guidance and Metrology Center (AGMC), Newark Air Force Station, Ohio, are described. Electronic counter time interval measurements are emphasized since this is the most common time comparison measurement in use. The proper use and setting of controls will be covered along with helpful hints and common mistakes to be avoided. Applications of time measurements are described and some of these are timekeeping via Loran-C, TV Line-10, and WWV. Frequency determination using periodic time readings will also be discussed. Author

N75-27180* Armament Development and Test Center, Eglin AFB, Fla.
USE OF PRECISION TIME AND TIME INTERVAL (PTTI) **c35**
J. D. Taylor *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 91-97 (For availability see N75-27173 18-31)
CSCL 09F

A review of range time synchronization methods are discussed as an important aspect of range operations. The overall capabilities of various missile ranges to determine precise time of day by synchronizing to available references and applying this time point to instrumentation for time interval measurements are described. M.C.F.

N75-27181* National Observatory, Rio de Janeiro (Brazil).
THE PRESENT DEVELOPMENT OF TIME SERVICE IN BRAZIL, WITH THE APPLICATION OF THE TV LINE-10 METHOD FOR COORDINATION AND SYNCHRONIZATION OF ATOMIC CLOCKS **c35**
Paulo Mourilhe Silva and Ivan Mourilhe Silva *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 99-107 refs (For availability see N75-27173 18-31)
CSCL 09F

Various methods presently used for the dissemination of time at several levels of precision are described along with future projects in the field. Different aspects of time coordination are reviewed and a list of future laboratories participating in a National Time Scale will be presented. A Brazilian Atomic Time Scale will be obtained from as many of these laboratories as possible. The problem of intercomparison between the Brazilian National

Time Scale and the International one will be presented and probable solutions will be discussed. Needs related to the TV Line-10 method will be explained and comments will be made on the legal aspects of time dissemination throughout the country. Author

N75-27182* National Bureau of Standards, Boulder, Colo. Time and Frequency Div.

THE MEASUREMENT OF FREQUENCY AND FREQUENCY STABILITY OF PRECISION OSCILLATORS c33

David W. Allan *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 109-142 refs (For availability see N75-27173 18-31)

CSCL 09C

The specification and performance of precision oscillators is discussed as a very important topic to the owners and users of these oscillators. This paper presents at the tutorial level some convenient methods of measuring the frequencies of precision oscillators -- giving advantages and disadvantages of these methods. Further it is shown that by processing the data from the frequency measurements in certain ways, one may be able to state more general characteristics of the oscillators being measured. The goal in this regard is to allow the comparisons of different manufacturers' specifications and more importantly to help assess whether these oscillators will meet the standard of performance the user may have in a particular application. Author

N75-27183* National Bureau of Standards, Boulder, Colo. Time and Frequency Div.

MEASUREMENTS OF THE SHORT-TERM STABILITY OF QUARTZ CRYSTAL RESONATORS: A WINDOW ON FUTURE DEVELOPMENTS IN CRYSTAL OSCILLATORS c33

F. L. Walls and A. E. Wainwright *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 143-157 refs (For availability see N75-27173 18-31)

CSCL 09C

Recent measurements of the inherent short-term stability of quartz crystal resonators are presented. These measurements show that quartz resonators are much more stable for times less than 1s than the best available commercial quartz oscillators. A simple model appears to explain the noise mechanism in crystal controlled oscillators and points the way to design changes which should permit more than 2 orders of magnitude improvement in their short-term stability. Calculations show that a reference signal at 1 THz, derived from frequency multiplying a 5 MHz source with the above measured crystal stability, should have an instantaneous or fast linewidth of order 1 Hz. These calculations explicitly include the noise contribution of our present multiplier chains and are briefly outlined. Author

N75-27184* Edgerton, Germeshausen and Grier, Inc., San Ramon, Calif.

THE MAGNETIC MATRIX TIME INTERVAL METER c35

S. K. Merrill and B. V. Rodgers *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 159-163 refs (For availability see N75-27173 18-31)

(Contract AT(29-1)-1183)

CSCL 14B

A time interval meter is being developed which allows the recording of a number of event times with high resolution over a relatively long period of time. Author

N75-27185* Coast Guard, Washington, D.C. OMEGA Navigation System Operations Detail.

OMEGA NAVIGATION SYSTEM STATUS AND FUTURE PLANS c04

Thomas P. Nolan and David C. Scull *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 165-186 (For availability see N75-27173 18-31)

CSCL 17G

OMEGA is described as a very low frequency (VLF) radio navigational system operating in the internationally allocated navigation band in the electromagentic spectrum between 10 and 14 kilohertz. Full system implementation with worldwide coverage from eight transmitting stations is planned for the latter 1970's. Experimental stations have operated since 1966 in support of system evaluation and test. These stations provided coverage over most of the North Atlantic, North American Continent, and eastern portions of the North Pacific. This coverage provided the fundamental basis for further development of the system and has been essential to the demonstrated feasibility of the one to two nautical mile root-mean-square system accuracy. OMEGA is available to users in all nations, both on ships and in aircraft. Author

N75-27186* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

RECENT FIELD TEST RESULTS USING OMEGA TRANSMISSIONS FOR CLOCK SYNCHRONIZATION c04

A. R. Chi and S. C. Wardrip *In its* Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 187-197 refs (For availability see N75-27173 18-31)

CSCL 17G

The results are presented of clock synchronization experiments using OMEGA transmissions from North Dakota on 13.10 kHz and 12.85 kHz. The OMEGA transmissions were monitored during April 1974 from NASA tracking sites located at Madrid, Spain; Canary Island; and Winkfield, England. The sites are located at distances between 6600 kilometers (22,100 microseconds) to 7300 kilometers (24,400 microseconds) from North Dakota. The data shows that cycle identification of the received signals was accomplished. There are, however, discrepancies between the measured and calculated propagation delay values which have not been explained, but seem to increase with distance between the receiver and the transmitter. The data also indicates that three strategically located OMEGA transmitting stations may be adequate to provide worldwide coverage for clock synchronization to within plus or minus two (2) microseconds. Author

N75-27187* Army Metrology and Calibration Center, Redstone Arsenal, Ala.

FREQUENCY CALIBRATION TECHNIQUES c33

James M. Williams, Jr. and Joseph M. Rivamonte *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 199-208 (For availability see N75-27173 18-31)

CSCL 17B

The techniques and standards used by the U. S. Army Metrology and Calibration Center for frequency calibration are discussed. Author

N75-27188* Naval Air Test Center, Patuxent River, Md.

THE GLOBAL RESCUE ALARM NET (GRAN): CONCEPT AND APPROACHES c32

Clara L. Calise and William R. Crawford *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 209-222 refs (For availability see N75-27173 18-31)

CSCL 17B

The GRAN Experiment is designed to prove a world-wide search and rescue (SAR) system utilizing Omega navigation system signals and geo-synchronous satellites. In order to develop a SAR system, the original NASA Omega Position Locating Equipment (OPLE) experiments have been expanded by the Naval Air Test Center, Patuxent River. Specifically, a fourth frequency (10.880 KHz) has been added experimentally to two Omega transmitters. This will increase line of position (LOP) ambiguities from 72 nautical miles to 360 nmi apart. Algorithms have been developed to resolve the 360 nmi ambiguities. During September and October 1974, two series of tests were conducted with Lincoln Experimental Satellite 6 (LES-6) to demonstrate the position locating potential of the four-frequency Omega concept. Author

N75-27189* Institute for Telecommunication Sciences, Boulder, Colo.

A GENERAL DESCRIPTION OF LORAN-C: PRESENT AND POTENTIAL APPLICATIONS c04

Robert H. Doherty *In* NASA. Goddard Space Flight Center

Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 223-247 refs (For availability see N75-27173 18-31)
CSCL 17G

Loran-C is a low frequency (100 kHz) pulse nagivation system. The pulse format and phase stability of the system are of paramount importance for both navigation and time synchronization using this system. Present Loran-C installations operated by the U. S. Coast Guard cover much of the northern hemisphere. A recent government-wide decision has declared that Loran-C will be the U. S. Coastal confluence navigation system for the immediate future. Therefore, Loran-C stations are presently being installed or planned to cover the entire U. S. coastline.
Author

N75-27190* Naval Observatory, Washington, D.C.
DESIGN AND OPERATION OF A LORAN-C TIME REFERENCE STATION **c04**
Kenneth Putkovich *In* NASA. Goddard Space Flight Center Proc. of the Sixth. Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 249-262 refs (For availability see N75-27173 18-31)
CSCL 17G

Some of the practical questions that arise when one decides to use Loran-C in a time reference system are explored. An extensive effort is made to provide basic, practical information on establishing and operating a reference station. Four areas were covered: (1) the design, configuration and operational concepts which should be considered prior to establishing and operating a reference station using Loran-C, (2) the options and tradeoffs available regarding capabilities, cost, size, versatility, ease of operation, etc., that are available to the designer, (3) what measurements are made, how they are made and what they mean, and (4) the experience the U.S. Naval Observatory Time Service Division has had in the design and operation of such stations.
Author

N75-27191* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PERFORMANCE OF LORAN-C CHAINS RELATIVE TO UTC **c04**
A. R. Chi *In* Its Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 263-303 refs (For availability see N75-27173 18-31)
CSCL 17G

The long term performance of the eight Loran-C chains in terms of the Coordinated Universal Time (UTC) of the U.S. Naval Observatory (USNO) and the use of the Loran-C navigation system to maintain the user's clock to a UTC scale, are examined. The atomic time (AT) scale and the UTC of several national laboratories and observatories relative to the international atomic time (TAI) are presented. In addition, typical performance of several NASA tracking station clocks, relative to the USNO master clock, is also presented. Recent revision of the Coordinated Universal Time (UTC) by the International Radio Consultative Committee (CCIR) is given in an appendix.
Author

N75-27192* Coast Guard, Washington, D.C.
LORAN-C EXPANSION: IMPACT ON PRECISE TIME/TIME INTERVAL **c04**
John F. Roeber, Jr. *In* NASA. Goddard Space Flight Center Proc. of the Sixth. Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 305-318 (For availability see N75-27173 18-31)
CSCL 17G

On 16 May 1974, it was announced that Loran-C was chosen as the navigation system to serve the U. S. Coastal Confluence Zone. At the present time, reliable CONUS Loran-C groundwave timing coverage extends westward only about as far as Boulder, CO. The groundwave hyperbolic and timing coverage which will result from the planned CONUS expansion are illustrated. Time frames are provided. A status report on the planned reduction in Loran-C PTTI tolerances is presented.
Author

N75-27193* Army Electronics Command, Fort Monmouth, N.J. Communications/Automatic Data Processing Lab.
GROUND EFFECTS ON LORAN-C SIGNALS **c04**
D. C. Pearce and J. W. Walker *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 319-343 refs (For availability see N75-27173 18-31)
CSCL 17G

In conjunction with the test and evaluation of the position fixing capabilities of the Army Manpack Loran Receiver AN/PSN-6, an extensive series of time difference and signal amplitude measurements were made within a 100 km map grid square encompassing Fort Monmouth, New Jersey. The test location is within the coverage area of the East Coast Loran-C Chain. The data were used to develop a simple smooth-earth model for the test area as well as to estimate the magnitude and distributions of deviations from this model. Local propagation processes associated with topographic features and the grid of overhead wires in the test area are shown to contribute to the deviations from the model.
Author

N75-27194* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
APPLICATION OF VERY LONG BASELINE INTERFEROMETRY TO ASTROMETRY AND GEODESY: EFFECTS OF FREQUENCY STANDARD INSTABILITY ON ACCURACY **c43**
T. A. Clark, A. R. Whitney (Northeast Radio Observatory Corp.), A. E. E. Rogers (Northeast Radio Observatory Corp.), H. F. Hinteregger (Northeast Radio Observatory Corp.), L. B. Hanson (Northeast Radio Observatory Corp.), C. C. Counselman, III (Mass. Inst. of Tech., Cambridge), and I. I. Shapiro (Mass. Inst. of Tech.) *In* Its Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 349-359 refs (For availability see N75-27173 18-31)
CSCL 08E

The accuracy of geodetic and astrometric information obtained from very long baseline interferometry (VLBI) observations is dependent upon the stability of the frequency standard, or clock, used at each site of VLBI array. The sensitivities of two hydrogen maser frequency standards of different design to pressure, temperature, and magnetic field variations were measured; and, for one of the standards, sensitivity was found to be severe enough to degrade the information content of VLBI measurements. However, the effect on the geometric and astrometric information of such clock instabilities, with time scales of hours or greater, can be sharply reduced through the use of differencing techniques.
Author

N75-27195* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
WORLDWIDE TIME AND FREQUENCY SYNCHRONIZATION BY PLANNED VLBI NETWORKS **c32**
Robert J. Coates and Thomas A. Clark *In* Its Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 361-371 (For availability see N75-27173 18-31)
CSCL 17B

Accurate baseline determinations and clock synchronization results obtained from the Quasar Patrol observations at X band with the Goldstone-Haystack baseline are presented. In addition, data from stations at Greenbank, West Virginia, and Onsala, Sweden were used. It was estimated that clock accuracy was on the order of 16 cm.
Author

N75-27196* Hulburt (E. O.) Center for Space Research, Washington, D.C.
RADIO ASTROMETRY **c32**
Kenneth J. Johnston *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 373-379 refs (For availability see N75-27173 18-31)
CSCL 17B

The utilization of conventional and VLBI interferometer techniques for accurate determination of UTI, polar motion, and radio source position catalog data is discussed.
Author

N75-27197* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
FREQUENCY STANDARDS REQUIREMENTS OF THE NASA DEEP SPACE NETWORK TO SUPPORT OUTER PLANET MISSIONS **c32**
Henry F. Fliegel and C. C. Chao *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time

Interval (PTTI) Planning Meeting 1974 p 381-393 (For availability see N75-27173 18-31)
CSCL 17B

Navigation of Mariner spacecraft to Jupiter and beyond will require greater accuracy of positional determination than heretofore obtained if the full experimental capabilities of this type of spacecraft are to be utilized. Advanced navigational techniques which will be available by 1977 include Very Long Baseline Interferometry (VLBI), three-way Doppler tracking (sometimes called quasi-VLBI), and two-way Doppler tracking. It is shown that VLBI and quasi-VLBI methods depend on the same basic concept, and that they impose nearly the same requirements on the stability of frequency standards at the tracking stations. It is also shown how a realistic modelling of spacecraft navigational errors prevents overspecifying the requirements to frequency stability. Author

N75-27198* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RELATIVISTIC EFFECTS OF THE ROTATION OF THE EARTH ON REMOTE CLOCK SYNCHRONIZATION c35
Victor Reinhardt *In* Its Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 395-424 refs (For availability see N75-27173 18-31)
CSCL 20J

A treatment is given of relativistic clock synchronization effects due to the rotation of the earth. Unlike other approaches, the point of view of an earth fixed coordinate system is used which offers insight to many problems. An attempt is made to give the reader an intuitive grasp of the subject as well as to provide formulae for his use. Specific applications to global timekeeping, navigation, VLBI, relativistic clock experiments, and satellite clock synchronization are discussed. The question of whether atomic clocks are ideal clocks is also treated. Author

N75-27199* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A RELATIVISTIC ANALYSIS OF CLOCK SYNCHRONIZATION c35
J. B. Thomas *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 425-439 refs (For availability see N75-27173 18-31)
CSCL 20J

The relativistic conversion between coordinate time and atomic time is reformulated to allow simpler time calculations relating analysis in solar-system barycentric coordinates (using coordinate time) with earth-fixed observations (measuring earth-bound proper time or atomic time.) After an interpretation of terms, this simplified formulation, which has a rate accuracy of about 10 to the minus 15th power, is used to explain the conventions required in the synchronization of a world wide clock network and to analyze two synchronization techniques-portable clocks and radio interferometry. Finally, pertinent experiment tests of relativity are briefly discussed in terms of the reformulated time conversion. Author

N75-27200* Army Electronics Command, Fort Monmouth, N.J. Communications/Automatic Data Processing Lab.
PLASMASPHERIC EFFECTS ON ONE WAY SATELLITE TIMING SIGNALS c32
F. J. Gorman, Jr. and H. Soicher *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 441-452 ref (For availability see N75-27173 18-31)
CSCL 17B

The effects of the ionospheric retardation of satellite-emitted timing signals was presented. The retardation at the navigation frequencies, which is proportional to the total ionospheric electron content (TEC), was determined by Faraday polarization measurements of VHF emissions of a geostationary satellite. The polarization data yielded TEC up to approximately 1200 km only, since the measurement technique is based on the Faraday effect which is weighted by the terrestrial magnetic field. Author

N75-27201* Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
A PASSIVE SUBMICROSECOND TIME DISSEMINATION SYSTEM c32
R. J. Taylor *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 453-464 refs (For availability see N75-27173 18-31)
CSCL 17B

A submicrosecond time dissemination system was developed. The system is composed of an experimental transit improvement satellite (TRIAD), TRANET Satellite Tracking System, and special satellite signal receivers each tied to separate cesium clocks. The 400 MHz signal from the satellite is phase modulated plus or minus 45 deg by a pseudo-random noise (PRN) digital code with a bit rate of 5/3 MHz. Evaluation of this system has shown that satellite oscillator frequency instabilities are the major source of error. Experiments indicate that Global time transfers can be made with errors less than 100 nanoseconds. Author

N75-27202* Space and Missile Systems Organization, Los Angeles Air Force Station, Calif.
NAVSTAR: GLOBAL POSITIONING SYSTEM AN EVOLUTIONARY RESEARCH AND DEVELOPMENT PROGRAM c04
B. W. Parkinson *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 465-498 (For availability see N75-27173 18-31)
CSCL 17G

A description is given of NAVSTAR and the conception validation program for the system. System compatibility and performance projections are discussed. E.H.W.

N75-27203* Naval Research Lab., Washington, D.C.
RESULTS OF THE FIRST 150 DAYS OF THE NTS-1 SOLAR CELL EXPERIMENTS c44
Richard L. Statler *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Internal (PTTI) Planning Meeting 1974 p 503-511 refs (For availability see N75-27173 18-31)
CSCL 10A

Twelve solar cell experiments were on the Naval Research Laboratory NTS-1 satellite launched on 14 July 1974, into a 13,260 km circular orbit at an inclination of 125 deg. The experiment comprises: 2 ohm-cm n/p, lithium-diffused p/n, violet n/p, p(+) back surface field, and ultra-thin wrap around contact cells. The short-circuit current of the experiments ranged from 2 to 12 percent higher in space than under solar simulators. During the 5 year life of the satellite, the experiments will be exposed to radiation equivalent to 2 x 10 to the 15th power 1-MeV electron cm/2 and to nearly 5500 thermal cycles. Author

N75-27204* Australian Capital Territory. Div. of National Mapping.
STATISTICAL ANALYSIS OF TIME TRANSFER DATA FROM TIMATION 2 c35
J. McK. Luck and P. Morgan *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 513-531 refs (For availability see N75-27173 18-31)
CSCL 20J

Between July 1973 and January 1974, three time transfer experiments using the Timation 2 satellite were conducted to measure time differences between the U.S. Naval Observatory and Australia. Statistical tests showed that the results are unaffected by the satellite's position with respect to the sunrise/sunset line or by its closest approach azimuth at the Australian station. Further tests revealed that forward predictions of time scale differences, based on the measurements, can be made with high confidence. Author

N75-27205# National Bureau of Standards, Washington, D.C.
DIMENSIONS/NBS, VOLUME 59, NUMBER 1, JANUARY 1975 Monthly Technical News Bulletin
Jan. 1975 25 p
(COM-75-50141-01; NBS/DIM-59/1; LC-25-26527) Avail: NTIS MF $2.25; SOD HC $0.80 as C13.13:59/1 Also available from SOD on subscription $9.45/year domestic, $11.85/year foreign CSCL 05B

This monthly magazine features short summaries of major technical developments, highlights of work in progress, major speeches and statements by Bureau management, and a listing of NBS publications. The table of contents for the current issue is: Computers automate jet engine tuneups; NBS camera keeps eye on nuclear fuels; Crime labs aided by NBS glass standard; Survey results in new data on household fires; Energy research: The long-term perspective; Highlights; NBS to hold measurement seminars; Survey shows schools going metric; NBS strengthens consumer programs; NBS, industry to join in ethylene study; New flammability standard for sleepwear; Publication. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N75-27206 British Library Lending Div., Boston Spa (England).
DIELECTRIC-LOADED HORN ANTENNA AND ITS CROSS POLARIZATION CHARACTERISTICS
T. Satoh 9 Dec. 1974 17 p Transl. into ENGLISH from KDD Tech. J. (Japan), v. 77, Jul. 1973 p 1-22
(BLL-TRANS-3152-(9022.81)) Avail: British Library Lending Div., Boston Spa, Engl.: 2 BLL photocopy coupons

The principle of the dielectric-loaded horn antenna and its measured radiation characteristics are discussed. As the cross-polarization of this antenna is low, it is suitable for frequency re-use purposes and can be used as a primary radiator of a reflector antenna or for a satellite-borne global beam antenna. Its operating characteristics are described. Author

N75-27207 British Broadcasting Corp., Kingswood (England).
IONOSPHERIC PROPAGATION IN VHF TELEVISION BAND 1
L. F. Tagholm, C. P. Bell, and P. Knight Jun. 1975 17 p refs
(BBC-RD-1975/17) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

In order to study the effect of sporadic-E interference on VHF television broadcasting, the European Broadcasting Union conducted an extensive series of measurements, which were continued for 11 years in order to cover a complete sunspot cycle. Measurements were made over 26 paths whose lengths varied between 900 and 2500 km, using frequencies between 40 and 60 MHz. The measurements, their analysis, and the results obtained are described. The final results were used to construct propagation curves for Europe and to derive a field-strength prediction method which may be used for the planning of future V.H.F. broadcasting services. Author

N75-27208 British Broadcasting Corp., Kingswood (England).
CEEFAX: TESTS ON THREE POSSIBLE CHOICES OF SECONDARY CODE
N. E. Tanton Jun. 1975 10 p refs
(BBC-RD-1975/18) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

Coded data-signals for the CEEFAX data-broadcasting system are combined with the picture signal before transmission. The whole television signal is subject to noise and waveform distortion within the transmission path which can give rise to information errors when the data-signal is decoded in a CEEFAX receiver. Three binary codes suitable for the transmission of coded data on the television waveform are compared on theoretical and practical grounds for a practical data-broadcasting system. Ruggedness in the face of signal distortion and noise, possible data-rate within the given bandwidth, and the complexity of decoding circuits in CEEFAX receivers were taken into account. It was assumed that receivers for CEEFAX will incorporate synchronous detection (i.e. data will not suffer quadrature distortion), a.f.c. (i.e. tuning errors will be negligible), and that the overall group delay distortion will be small. The results indicate that None return to Zero code offers the best choice for a coded-data-broadcasting system. Author

N75-27209 British Broadcasting Corp., Kingswood (England).
STEREOPHONIC RECEPTION USING THE PILOT-TONE SYSTEM: COMPATIBILITY OF CURRENT RECEIVERS WHEN QUADRATURE SUBCARRIER MODULATION IS ADDED
D. J. Whythe Jun. 1975 9 p refs
(BBC-RD-1975/19) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

The results are described of measurements made on ten current stereo receivers to determine the effect on stereo reception when a pair of sidebands are added in quadrature to those of the existing differnce signal, centered on 38 kHz. The measurements were mainly objective but the results of a brief listening test are also described. The effect, which is more marked with some receivers than with others, is to cause a shift of the stereo image to the left or right and, to an extent which is less objectionable subjectively, to increase the levels of second- and third-harmonic distortion. It is believed that the shift of the stereo image could be overcome at little extra cost in future-generation stereo decoders, but to reduce the level of distortion may require significant change to the design of particular decoders. Author

N75-27210 Syracuse Univ., N.Y.
NEW INSIGHTS INTO NOISE THRESHOLDS IN COMMUNICATIONS Ph.D. Thesis
Lance Dawson Whitehead 1974 152 p
Avail: Univ. Microfilms Order No. 75-14035

The basic limitations on the performance of nonlinear analog communication systems are identified and some insights are given into threshold phenomena. A model of nonlinearly modulated signals is developed and a geometric description of their characteristics in signal space is given. Quantitative definitions of accuracy and reliability are introduced and the limitations on the accuracy and reliability of a receiver output are examined. It is shown that, for well-behaved modulation processes, loss of accuracy limits system performance when the dimensionality of the signal space is low. Loss of reliability ultimately limits the performance of systems that use high-dimensional signals to take advantage of the weak noise suppression phenomenon, and causes a sharp noise suppression threshold effect. The fundamental limitation on the receiver output is shown to be equivalent to the basic limitations on the information content of the received signal. Dissert. Abstr.

N75-27211 Houston Univ., Tex.
PROBABILITY OF ERROR IN BANDLIMITED SPREAD SPECTRUM BINARY COMMUNICATION SYSTEMS Ph.D. Thesis
Phillip McClanahan Hopkins 1975 203 p
Avail: Univ. Microfilms Order No. 75-13944

The performance of a pseudonoise-modulated spread spectrum binary communication system is analyzed to determine the probability of error in the presence of bandlimiting, Gaussian noise, and synchronization errors. It is shown that the correlation receiver is an optimum receiver in the presence of white gaussian noise with no bandlimiting. Synchronization errors are introduced into the analysis in the form of a timing delay between the received code and local code. Bandlimiting is modeled by a causal low-pass filter at the input of the correlation receiver. Probability of error in detecting the binary message symbols is analyzed first by developing upper bounds based on the correlation properties of maximal length pseudonoise sequences and the decaying response typical of causal filters. Then, the average probability of error is computed using a series expansion of the characteristic function of the intersymbol interference. Results show that for large spreading ratios, the effects of inter-symbol interference are negligible. Synchronization errors in addition to bandlimiting further degrade the performance, but less dramatically than in the case of the infinite-bandwidth system.
Dissert. Abstr.

N75-27212*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Electrical Engineering.
THE INFLUENCE OF POLARIZATION ON MILLIMETER WAVE PROPAGATION THROUGH RAIN Final Report, 1 Jan. 1972 - 31 Dec. 1973
C. W. Bostian, W. L. Stutzman, Paris H. Wiley, and R. E. Marshall 1 Jan. 1974 99 p refs

(Grant NGR-47-004-091)
(NASA-CR-143686) Avail: NTIS HC $4.75 CSCL 17B

The limitations which precipitation depolarization will place on future millimeter wave earth-satellite communications systems employing orthogonal-polarization frequency sharing was studied and the possibility of improving the fade resistance of such systems either through polarization diversity operation or by the choice of the polarization(s) least subject to attenuation was examined. Efforts were confined largely to ground-based communications systems investigated during a twenty-seven month period. Plans to extend the theoretical results to satellite systems are discussed. Author

N75-27213# Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
DIGITAL BALLOON RADIO COMMAND Final Report
Theodore J. Pepin and Royce W. Lane Apr. 1974 21 p
(Contract N00014-70-A-266-0004)
(AD-A003907) Avail: NTIS CSCL 17/2

A light weight digital radio command is described for balloon flight use. GRA

N75-27214# Eidgenossische Technische Hochschule, Zurich (Switzerland).
GROUP DELAY, DELAY DISTORTION AND ITS MEASUREMENT Ph.D. Thesis
Hugo Vifian 1973 162 p refs
(Rept-5053) Avail: NTIS HC $6.25

The meaning of the term group delay with respect to signal delay and signal distortion in linear networks is investigated. The relationship between group delay and the propagation delay of the various signal parts is derived. The effects upon signal distortion due to departures from the distortionless transfer characteristic are then investigated in general, and for amplitude and angle modulated signals. In particular the group delay information is shown to be inadequate to describe the departures from linear phase, although it is a useful expression in the case of narrow band signals. In most communications applications the constant group delay requirement is sufficient and the imparement due to this relaxation are minor. Some measuring techniques to determine the group delay information as well as the deviations from the ideal network characteristic are shown. A more general way of determining the distortion on modulated signals directly is developed and some measuring solutions are proposed. Author

N75-27215*# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
RESEARCH IN MILLIMETER WAVE TECHNIQUES Semiannual Status Report
J. W. Dees 27 Jun. 1975 39 p
(Grant NsG-5012)
(A-1642; NASA-CR-143140) Avail: NTIS HC $3.75 CSCL 20J

A model 180-GHz radiometer, employing a Cassegrain feed geometry with a parabolic main reflector and a subreflector fed by a corrugated conical horn, was constructed and tested. An absorber-coated chopper is used to modulate the signal, which is down-converted in a cross-guide harmonic mixer. A 100-GHz source was used to evaluate mixer performance and to optimize system parameters. Preliminary results indicate a noise figure of approximately 20 db is being achieved. Preliminary design studies and on-going research plans are discussed. Author

N75-27216# Erlangen-Nuremberg Univ. (West Germany).
A CONTRIBUTION TO CALCULATING THE INTERMODULATION AND AM/PM CONVERSION DISTORTIONS OF LINEARLY FILTERED, ANGLE MODULATED SIGNALS Ph.D. Thesis [EIN BEITRAG ZUR BERECHNUNG DER INTERMODULATIONS- UND AM/PM KONVERSIONS VERZERR UNGEN LINEAR GEFILTERTER WINKELMODULIERTER SIGNALE]
Manfred Welzenbach 1973 157 p refs In GERMAN
Avail: NTIS HC $6.25

An analytical method for calculating intermodulation- and AM/PM conversion-distortions in linearly filtered, angle modulated signals is reported. The linear transfer system between modulator and demodulator is formulated by power series simulation. Transl. by G.G.

N75-27217# Joint Publications Research Service, Arlington, Va.
LEGAL ASPECTS OF SPACE COMMUNICATIONS
A. S. Piradov, ed. 9 Jul. 1975 25 p refs Transl. into ENGLISH from the book "Mezhdunarodnoye Kosmicheskoye Pravo" Moscow, Izdatelstvo Mezhdunarodnyye Otnosheniya, 1974 p 164-185, 225-233
(JPRS-65173) Avail: NTIS HC $3.25

Data are presented on the regulation of various aspects of space activities and the international cooperation of the U.S.S.R. in the study and use of space. Other topics discussed include space communications, direct television broadcasting via satellites, and international jurisdictions. Author

N75-27218*# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
S-BAND OMNIDIRECTIONAL ANTENNA FOR THE SERT-C SATELLITE Final Report, Jun. 1974 - Apr. 1975
H. L. Bassett, J. W. Cofer, Jr., R. R. Sheppard, and M. J. Sinclair May 1975 175 p refs
(Contract NAS3-18901)
(NASA-CR-134812; GIT-A-1651) Avail: NTIS HC $6.25 CSCL 17B

The program to design an S-band omnidirectional antenna system for the SERT-C spacecraft is discussed. The program involved the tasks of antenna analyses by computer techniques, scale model radiation pattern measurements of a number of antenna systems, full-scale RF measurements, and the recommended design, including detailed drawings. A number of antenna elements were considered: the cavity-backed spiral, quadrifilar helix, and crossed-dipoles were chosen for in-depth studies. The final design consisted of a two-element array of cavity-backed spirals mounted on opposite sides of spacecraft and fed in-phase through a hybrid junction. This antenna system meets the coverage requirement of having a gain of at least minus 10 dBi over 50 percent of a 4 pi steradian sphere with the solar panels in operation. This coverage level is increased if the ground station has the capability to change polarization. Author

N75-27219# Lockheed Missiles and Space Co., Palo Alto, Calif.
CERTAIN QUESTIONS OF THE POTENTIAL INTERFERENCE-IMMUNITY OF POLARIZATION MODULATION (PM) SIGNAL RECEIVING SYSTEMS
K. G. Gusev 1974 28 p refs Transl. into ENGLISH from the book "Poliarizatsionnaia Moduliatsiia" Moscow, Sovetskoe Radio, 1974 p 246-281
Avail: NTIS HC $3.75; National Translation Center, John Crerar Library, Chicago, Illinois 60616

The determination of the interference-immunity of communications radio lines using PM signals is discussed along with signal receiving systems. Two kinds of errors were differentiated in estimating the polarization parameters of a PM signal in an interference background. The first is caused by the shift in the maximum of the signal component of the output effect subjected to interference near the true value of the polarization parameter being measured. The second kind of error is due to the possibility of receiving the interference component of the output effect after the signal component. Since the method of the maximum equal-likelihood function is mainly applicable in the estimation of PM signal polarization parameters when the maximum signal component lies (with probability almost one) in the neighborhood of the true value of the parameter being estimated, the probability of a reliable estimate is used for the interference-immunity characteristic of receiving systems to estimate the polarization parameters. Author

N75-27220# Lockheed Missiles and Space Co., Palo Alto, Calif.
SIGNALS WITH DISCRETE POLARIZATION MODULATION (DPM), CHAPTER 5
K. G. Gusev, A. D. Filatov, and A. P. Sopolev 1974 20 p Transl. into ENGLISH from the book "Poliarizatsionnaia Moduliatsiia" Moscow, Sovetskoe Radio, 1974 p 109-136
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago, Illinois 60616

A mathematical analysis (Fourier series) of polarized radio waves and its application to various communication systems is presented. J.R.T.

N75-27221*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Telecommunications Div.
A PRACTICAL STATISTICAL MODEL FOR TELECOMMUNICATIONS PERFORMANCE UNCERTAINTY
Joseph H. Yuen 15 Jun. 1975 36 p refs
(Contract NAS7-100)
(NASA-CR-143193; JPL-TM-33-732) Avail: NTIS HC $3.75 CSCL 17B

A statistical method, the probability distribution method, is presented which will give the probability of link performance values. The advantages of a design control procedure are preserved and optimum use of the system capabilities is permitted by improving the accuracy and completeness of the system model. Author

N75-27222# Technische Universitaet, Brunswick (West Germany).
ON THE SIGNIFICANCE OF SYSTEM DYNAMICS FOR THE CONSTRUCTION OF SIGNAL PROCESSING APPARATUS Ph.D. Thesis [UEBER DIE BEDEUTUNG DER SYSTEMDYNAMIK FUER DIE KONSTRUKTION SIGNALVERARBEITENDER GERAETE]
Hans-Joachim Aschoff 1974 242 p refs In GERMAN
Avail: NTIS HC $7.50

The construction of signal processing systems by a functional model realizes the desired dependency between input and output signals by parameter optimization procedures. Example calculations for a pressure measuring apparatus use functional blocks to solve partial functions of signal flow for the transducer so that it delivers pressure proportional electric current to the moving coil meter. Transl. by G.G.

N75-27223# IIT Research Inst., Chicago, Ill.
ANALYSIS, TEST AND EVALUATION SUPPORT TO THE USAF ADVANCED LANDING SYSTEM PROGRAM. VOLUME 1: PROGRAM DESCRIPTION AND RESULTS Final Report, Jan. 1972 - May 1974
A. E. Brindley, L. C. Calhoun, T. N. Patton, and L. Valcik Aug. 1974 301 p refs
(Contract F33615-72-C-1024)
(AD-A004419; AFFDL-TR-74-62-Vol-1) Avail: NTIS CSCL 17/7

The report describes the efforts undertaken by IITRI in support of USAF's microwave landing system concept validation program. It is concluded that the doppler guidance technique is conceptually sound but that considerable work is required to improve the implementation of the technique; fundamental research in the area of multipath reflections is strongly recommended. GRA

N75-27224# IIT Research Inst., Chicago, Ill.
ANALYSIS, TEST AND EVALUATION SUPPORT TO THE USAF ADVANCED LANDING SYSTEM PROGRAM. VOLUME 2: INDEX OF APPROACHES Final Report, Jan. 1972 - May 1974
A. E. Brindley, L. C. Calhoun, T. N. Patton, and L. Valcik Aug. 1974 73 p refs
(Contract F33615-72-C-1024)
(AD-A004420; AFFDL-TR-74-62-Vol-2) Avail: NTIS CSCL 17/7

Volume II is an index of the approaches flown during the MLS Concept Validation Program. Part I lists the approaches in the order that they were flown; it also contains information on the magnetic storage location of reduced data. An explanation of the terms used is given as is a code for the notes used on the index of data. Data from these approaches are plotted and contained in Volume III. Part II is a listing of the approaches after sorting. The sorting brings together similar approaches for comparison purposes. GRA

N75-27225# IIT Research Inst., Chicago, Ill.
ANALYSIS, TEST AND EVALUATION SUPPORT TO THE USAF ADVANCED LANDING SYSTEM PROGRAM. VOLUME 3, PART 1: DOPPLER MLS GUIDANCE ERROR DATA (DOTS TRACKING SYSTEM) Final Report, Jan. 1972 - May 1974
A. E. Brindley, L. C. Calhoun, T. N. Patton, and L. Valcik Aug. 1974 275 p
(Contract F33615-72-C-1024)
(AD-A004421; AFFDL-TR-74-62-Vol-3-Pt-1) Avail: NTIS CSCL 17/7

Volume III, Part I contains guidance error data for the Doppler MLS computed from the Digital Optical Tracking System (DOTS) information. Separate plots are included for the azimuth system and the elevation system. Volume III, Parts 1, 2, and 3 contain the data used in determining the findings presented in Volume I. GRA

N75-27226# IIT Research Inst., Chicago, Ill.
ANALYSIS, TEST AND EVALUATION SUPPORT TO THE USAF ADVANCED LANDING SYSTEM PROGRAM. VOLUME 3, PART 2: DOPPLER MLS GUIDANCE ERROR DATA (M-33 TRACKING SYSTEM, FLIGHTS 22 JUNE 1973 TO 10 SEPTEMBER 1974) Final Report, Jan. 1972 - May 1974
A. E. Brindley, L. C. Calhoun, T. N. Patton, and L. Valcik Aug. 1974 323 p
(Contract F33615-72-C-1024)
(AD-A004422; AFFDL-TR-74-62-Vol-3-Pt-2) Avail: NTIS CSCL 17/7

For abstract, see N75-27225.

N75-27227# IIT Research Inst., Chicago, Ill.
ANALYSIS, TEST AND EVALUATION SUPPORT TO THE USAF ADVANCED LANDING SYSTEM PROGRAM. VOLUME 3, PART 3: DOPPLER MLS GUIDANCE ERROR DATA (M-33 TRACKING SYSTEM, FLIGHTS 12 SEPTEMBER 1973 TO 29 JANUARY 1974) Final Report, Jan. 1972 - May 1974
A. E. Brindley, L. C. Calhoun, T. N. Patton, and L. Valcik Aug. 1974 283 p
(Contract F33615-72-C-1024)
(AD-A004423; AFFDL-TR-74-62-Vol-3-Pt-3) Avail: NTIS CSCL 17/7

For abstract, see N75-27225.

N75-27228# Naval Postgraduate School, Monterey, Calif.
ASAP ANTENNAS-SCATTERERS ANALYSIS PROGRAM, A GENERAL PURPOSE USER-ORIENTED COMPUTER PROGRAM FOR ANALYSIS OF THIN-WIRE STRUCTURES IN THE PRESENCE OF FINITE GROUND M.S. Thesis
Jerry Wayne McCormack Dec. 1974 134 p refs
(AD-A004227; NPS-52AB74122) Avail: NTIS CSCL 09/5

Previous computer programs to solve the electro-magnetic equations for thin-wire radiating structures have been coded in one of two forms; the very limited specialized form or the comprehensive all encompassing form. Thus, the beginning user, engineer or student, must possess expertise in computer programming as well as in electro-magnetic theory. This thesis develops a computer program which can be used by the student to gain insight into wire radiating structures and, at the same time, be used by the engineer to obtain the expertise necessary to use the more comprehensive programs. GRA

N75-27229# Northwestern Univ., Evanston, Ill. Dept. of Electrical Engineering.
APPLICATION OF GRAPH THEORY TO PROBLEMS IN COMMUNICATIONS SYSTEMS AND NETWORKS Interim Scientific Report, 1 Jul. 1973 - 31 Jun. 1974
S. L. Hakimi Aug. 1974 11 p refs
(Grant AF-AFOSR-2103-71; AF Proj. 9749)
(AD-A004155; AFOSR-75-0055TR) Avail: NTIS CSCL 12/2

The research problems successfully considered during the past year can be broadly classified into three areas: (1) Communication Networks with Emphasis on Their Reliability, (2) Digital Systems and Computer Applications, and (3) Topics in Pure and Applied Graph Theory. GRA

N75-27230# California Univ., Los Angeles. Dept. of Computer Science.
A SPEECH PROCESSING SYSTEM Interim Report
Sabina H. Saib Sep. 1974 166 p refs
(Grant AF-AFOSR-2384-72; AF Proj. 9769)

(AD-A004158; UCLA-ENG-7453; AFOSR-75-0069TR) Avail: NTIS CSCL 17/2

This thesis describes the development of a system which was used to study features in continuous speech. The study was limited to English vowels spoken in sentences. The voices of thirteen speakers, both male and female were used in an effort to study features in continuous speech. In particular, the study concentrated on a search for those features which are speaker invariant and those features which have not been studied in the past. This speech processing system was implemented on an IBM 360/91 general purpose computer. Data was collected in the UCLA Phonetics Laboratory and at the Systems Development Corporation. GRA

N75-27231# Stanford Research Inst., Menlo Park, Calif. Information Center.

ARPA NETWORK CURRENT NETWORK PROTOCOLS

Jon B. Postel and Elizabeth J. Feinler 1 Dec. 1974 513 p refs Revised

(Contract F30602-75-C-0123)

(AD-A003890; NIC-7104-Rev-1) Avail: NTIS CSCL 09/2

This notebook is a collection of documents that describe or specify the various protocols of the ARPA Computer Network as of December 1974. Protocols are the rules of communication between processes. The protocols defined here form a tree structure. The basic protocol described here is the IMP to Host Protocol. Built on that is the Host to Host Protocol. Then spreading out somewhat but still closely related are the process level protocols: TELNET, File Transfer, Remote Job Entry, and Graphics. Interspersed along the way are a few small protocols such as the Initial Connection Protocol, and the definition of the standard character set. GRA

N75-27232# Naval Research Lab., Washington, D.C.

SPREADING OF WAVES LAUNCHED BY ELF/VLF SATELLITE Interim Report

Francis J. Kelly, Dennis J. Baker, and Gerald A. Chayt 31 Dec. 1974 30 p refs

(NRL Proj. R07-30; RF21222401)

(AD-A004179; NRL-7814) Avail: NTIS CSCL 20/14

Radio signals from an ELF/VLF transmitting satellite may be propagated through the ionosphere to receiving antennas on the earth's surface. Among many factors important in estimating the received signal strength is the geometric spreading factor, d(Omega)/d(A sub E), measuring the area, d(A sub E), of the earth's surface intercepting the power radiated into the solid angle, d(Omega), from the satellite. The spreading factor has been isolated and accurately estimated by a ray-tracing computer program. Calculations have been performed for transmissions at 3 and 10 kHz and for three different ionospheric models using satellite altitudes ranging between 300 and 8000 km for some representative receiver point locations. Spreading factors were calculated both for direct and multiple hop waves in the earth-ionosphere waveguide. GRA

N75-27233# Naval Postgraduate School, Monterey, Calif.

ATMOSPHERIC TURBULENCE EFFECTS ON LASER COMMUNICATIONS SYSTEMS M.S. Thesis

Tadd Edward Spicer Dec. 1974 63 p refs

(AD-A004228) Avail: NTIS CSCL 17/2

A multiplicative model for the prediction of frequency translation effects of scintillation caused by atmospheric turbulence on a simple intensity modulated laser communication system is tested. A revised experimental procedure is implemented. Some data is examined which suggests inadequacies in the model in regard to the prediction of the bandwidth of the translated scintillation noise. In general, the observed bandwidth of the translated scintillation noise is less than predicted by the model, however, frequency translation effects are readily apparent. GRA

N75-27234# Naval Postgraduate School, Monterey, Calif.

A SPREAD SPECTRUM COMMUNICATION SYSTEM M.S. Thesis

Cain Garrett Dec. 1974 85 p refs

(AD-A004293) Avail: NTIS CSCL 17/2

The thesis reports on an investigation of a practical solution to the problem of providing covert, secure protection to the video channel of a remotely piloted vehicle (RPV) down-link. Spread spectrum technology employing acoustic surface wave devices and Golay complementary code sequences are used. Bandwidth reduction of the video data to a data rate of 200 kilobits per second is assumed. The thesis effort results in a transmitter/receiver combination with many of the desirable qualities of a video link for military RPV employment in a hostile environment. The hardware contains modifications that were made to facilitate system testing. Tests results are reported. GRA

N75-27235# Semcor, Inc., Moorestown, N.J.

AN EVALUATION OF SOME NEW APPROACHES TO AGILE BEAM RADAR DESIGN FOR SHIPBOARD APPLICATIONS, VOLUME 1 Final Report, Jan. - Oct. 1974

D. Billetter Oct. 1974 73 p

(Contract N00024-74-C-1028)

(AD-A003591; SD-1028-B101-01-Vol-1) Avail: NTIS CSCL 17/9

The report describes techniques for providing agile beam performance at a lower cost than that associated with a phase-steered planar array. Different antenna design techniques that can provide different levels of performance are analyzed to determine their performance limits and relative costs. Candidate techniques are identified that have the potential of providing performance better than that of a mechanically driven antenna and more economical than that of the phase-steered planar array. GRA

N75-27236# Semcor, Inc., Moorestown, N.J.

AN EVALUATION OF SOME NEW APPROACHES TO AGILE BEAM RADAR DESIGN FOR SHIPBOARD APPLICATIONS, VOLUME 2 Final Report, Jan. - Oct. 1974

Oct. 1974 236 p

(Contract N00024-74-C-1028)

(AD-A003592; SD-1028-B101-01-Vol-2) Avail: NTIS CSCL 17/9

Appendices to the report on agile beam radar design evaluation are presented. Topics covered include technique descriptions, phase-frequency steering, multiple line arrays composite patterns, cross polarization due to reflecting screen geometry, array and reflector pattern and scan analysis, array and reflector antenna patterns, array and reflector effects of multiple paths, effect of element pattern on array and reflector patterns, cost comparison, and computer programs. M.J.S.

N75-27237# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

NATURAL COMMUNICATION WITH COMPUTERS. VOLUME 3: DISTRIBUTED COMPUTATION RESEARCH AT BBN

William R. Sutherland and Robert H. Thomas Dec. 1974 77 p refs

(Contract DAHC15-71-C-0088; ARPA Order 1697)

(AD-A003479; BBN-2976-Vol-3) Avail: NTIS CSCL 09/2

This report describes research activities in distributed computation at BBN from July 1971 to October 1974. The objectives of this research in distributed computation are threefold: to identify and understand fundamental problems of computing in a distributed, multi-computer environment; to determine the impact of communications networks on computer systems; and, to develop techniques which enable convenient and effective use of the resources distributed throughout a computer network. GRA

N75-27238# Massachusetts Inst. of Tech., Cambridge.

TELECOMMUNICATIONS DEVELOPMENT IN INDONESIA

R. C. Butman 20 May 1974 53 p refs Sponsored by AID

(PB-240222/0) Avail: NTIS HC $4.25 CSCL 17B

Because of Indonesia's unusual geographic situation, because it is currently involved in a significant expansion of its communications system, and since it is completing plans for further expansion, it was considered an appropriate country in which to analyze the choices available in communications development. The concern of this report is a discussion of the transmission network and the communications requirements of the educational system. GRA

N75-27239# Federal Communications Commission, Washington, D.C. Research and Standards Div.

USER'S MANUAL FOR COORD (FCC COORDINATION CONTOUR PROGRAM FOR DOMESTIC SATELLITE EARTH STATIONS)
George L. Sharp Nov. 1974 114 p refs
(PB-240199/0; FCC/OCE/RS74-03) Avail: NTIS HC $5.25 CSCL 17B

A user's manual for, and a short description of, a FORTRAN 5 computer program is given for the calculation of the coordination contour around an international or domestic satellite earth station. Modifications of an earlier program were made to meet the needs of users throughout the telecommunications industry. The program is a computerization of the procedure outlined in the Final Acts of the World Administrative Radio Conference for Space Telecommunications which regulates the international coordination of an earth station, and of the similar procedure outlined in FCC Rules and Regulations, which regulates the domestic coordination of an earth station. GRA

N75-27240# Federal Communications Commission, Washington, D.C. Research and Standards Div.
TECHNICAL INFORMATION AND TECHNICAL RESEARCH REPORTS OF THE FEDERAL COMMUNICATIONS COMMISSION 1946-61, PART 1
Harry Fine and John M. Taff 22 Oct. 1956 63 p refs
(PB-240198/2; FCC/OCE/XRS-74/01) Avail: NTIS HC $4.25 CSCL 17B

Contents: An analysis of long term fading ranges for TV and FM service fields; propagation data and service calculation procedures used for the rescinded appendix 'A' of report and order (Docket 11532) released 6/26/56; the log-normal distribution; relationship of adjacent channel interference ratio to television service. GRA

N75-27241# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
COLLECTED REPRINTS, 1972 - 1973: WAVE PROPAGATION LABORATORY
Aug. 1974 532 p refs
(COM-75-10471/1; NOAA-75032105) Avail: NTIS; SOD HC CSCL 04A

This third volume of Collected Reprints comprises work published from 1 January 1972 through 31 December 1973. The papers included in this volume were selected to minimize duplication or extraneous material. Only abstracts rather than the full text of WPL NOAA Technical Reports are included. Following the Author Index is a section listing references for further reading as well as the complete table of contents for the volume Remote Sensing of the Troposphere, published in August, 1972. GRA

N75-27242# Sperry Rand Corp., Charlottesville, Va. Sperry Marine Systems Div.
CONDUCTING A MARINE RADAR TRANSPONDER EXPERIMENT AND STUDY, PHASE 2 Final Report, Nov. 1973 - May 1974
May 1974 64 p
(Contract MA-3-36249)
(COM-75-10467/9; JA-220-0077; MA-RD-900-75057) Avail: NTIS HC $4.25 CSCL 17I

A study was made to determine means for radar target identification, enhancement, and display and/or utilization by vessels having a cooperative radar and beacon system. Experiments used cooperating shore and ship radar and beacon systems. Interrogation and reply codes and information format for system use are considered, together with PRR, clock rates, A.G.C., and radar power radiated in determining system range and utility. GRA

N75-27243# Federal Communications Commission, Washington, D.C. Research and Standards Div.
A REPORT ON ANTENNA AND POWER STATISTICS TELEVISION STATIONS IN THE UNITED STATES
John C. H. Wang Dec. 1974 30 p refs
(PB-240200/6; FCC/OCE/RS74-04) Avail: NTIS HC $3.75 CSCL 17B

The report presents the results of a statistical study of antenna heights and authorized visual power (ERP) of both VHF and UHF television stations in the United States including Hawaii and Alaska. The statistical study covers the following major areas: antenna heights of VHF stations; antenna heights of UHF stations; authorized visual power of VHF stations; and, authorized visual power of UHF stations. GRA

N75-27188* Naval Air Test Center, Patuxent River, Md.
THE GLOBAL RESCUE ALARM NET (GRAN): CONCEPT AND APPROACHES
Clara L. Calise and William R. Crawford *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 209-222 refs (For availability see N75-27173 18-31)
CSCL 17B

N75-27195* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
WORLDWIDE TIME AND FREQUENCY SYNCHRONIZATION BY PLANNED VLBI NETWORKS
Robert J. Coates and Thomas A. Clark *In* Its Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 361-371 (For availability see N75-27173 18-31)
CSCL 17B

N75-27196* Hulburt (E. O.) Center for Space Research, Washington, D.C.
RADIO ASTROMETRY
Kenneth J. Johnston *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 373-379 refs (For availability see N75-27173 18-31)
CSCL 17B

N75-27197* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
FREQUENCY STANDARDS REQUIREMENTS OF THE NASA DEEP SPACE NETWORK TO SUPPORT OUTER PLANET MISSIONS
Henry F. Fliegel and C. C. Chao *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 381-393 (For availability see N75-27173 18-31)
CSCL 17B

N75-27200* Army Electronics Command, Fort Monmouth, N.J. Communications/Automatic Data Processing Lab.
PLASMASPHERIC EFFECTS ON ONE WAY SATELLITE TIMING SIGNALS
F. J. Gorman, Jr. and H. Soicher *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 441-452 ref (For availability see N75-27173 18-31)
CSCL 17B

N75-27201* Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
A PASSIVE SUBMICROSECOND TIME DISSEMINATION SYSTEM
R. J. Taylor *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 453-464 refs (For availability see N75-27173 18-31)
CSCL 17B

N75-27446 Joint Publications Research Service, Arlington, Va.
MECHANISM OF PROPAGATION OF SHORT RADIO WAVES BETWEEN IRKUTSK AND BELLINSGAUZEN IN ANTARCTICA
L. P. Kuperov *In its* Soviet Antarctic Inform. Bull. (JPRS-64980) 11 Jun. 1975 p 6-14 Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 29-34 (For availability see N75-27444 18-42)

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N75-27244 British Library Lending Div., Boston Spa (England).
ELECTRIC ENERGY AND NOISE
G. Pleeck 14 Feb. 1975 21 p refs Transl. into ENGLISH from French report Presented at 9th World Energy Conf., Detroit, 1974
(BLL-CE-Trans-6550-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.: 3 BLL photocopy coupons

Definitions, measurements, characteristics, criteria, propagation, limiting levels, and reduction methods of noise are discussed. Some typical power station equipment is considered, such as gas reducing valves, steam venting, fans, motors, turboalternators, transformers, turbojets, and high voltage lines. The trend to incorporate some acoustic absorption materials in the architecture of machine rooms in Belgium is reviewed. Ideas concerning the necessity of preliminary acoustical engineering studies for a new installation are also presented. J.A.M.

N75-27245 British Library Lending Div., Boston Spa (England).
STATISTICAL ANALYSIS OF THE EFFECT OF VARIOUS FACTORS ON THE QUALITY PHOTOLITHOGRAPHIC OPERATIONS IN THE MANUFACTURE OF INTEGRATED CIRCUITS
V. Yu. Timofeev, Yu. I. Savotin, and E. Kh. Levitman 11 Nov. 1974 7 p refs Transl. into ENGLISH from Iz. Vyssh. Zaved., Radioelektron. (USSR) v. 16, no. 4, 1973 p 30-34
(BLL-Trans-887-(9022.64)) Avail. British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

The photolithographic process is investigated statistically. Factors are determined which affect most strongly the linear dimensions of components and values are given of the distributions of these factors. Optimum conditions for carrying out various photolithographic operations are determined with the aid of multifactor experiments and distribution values of linear dimensions of components before and after optimization are given. A method is proposed for constructing a mathematical model of the whole technological process of photolithography. Author

N75-27246 British Library Lending Div., Boston Spa (England).
POSSIBLE METHODS OF CONSTRUCTION FOR THE DESIGN OF GYRATOR-C FILTERS
H. Gockler 11 Nov. 1974 18 p refs Transl. into ENGLISH from AEU, (West Germany) v. 28, no. 1, 1974 p 15-24
(BLL-Trans-897-(9022.64)) Avail: British Library Lending Div., Boston Spa, Engl.: 2 BLL photocopy coupons

Well-known procedures for realization of gyrator-C filters of different circuit structure are described together with the necessary equivalence for each: transformation of LC-ladder networks into gyrator-C circuits with or without floating gyrators respectively, synthesis of gyrator-C networks comprising nonstaggered or staggered mutual couplings of non-adjacent elements, respectively. These four filter structures are compared with each other considering various aspects for practical realization. Author

N75-27247 British Library Lending Div., Boston Spa (England).
DESIGN OF POWER TRANSFORMERS HAVING SIFERRIT CORES IN THE CASE OF SINUSOIDAL CONTROL
W. Dersch 31 Jul. 1974 11 p refs Transl. into ENGLISH from Bauteile Report 12, (West Germany) no. 1, 1974 p 15-19
(BLL-Trans-891-(9022.64)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

The maximum power which can be transmitted by transformers with ferrite cores is calculated on the basis of measured values and data lists. For transformers with pot cores and E cores made of SIFERRIT T26 the optimum design can be obtained immediately from diagrams, an excess temperature of 60 K and cooling by free convection in air being assumed. The power which can be transmitted increases in the frequency range up to 100 kHz with increasing frequency, and for pot coils of 9 to 70 mm diam. it reaches maximum values of 10 W to 2.5 kW. Measurements on random samples give good agreement with the given values. Author

N75-27248 British Library Lending Div., Boston Spa (England).
MEASURING THE LIFE OF PSN DIODES AT HIGH INJECTION LEVELS
F. Dannhauser 31 Jul. 1974 8 p refs Transl. into ENGLISH from Siemens Res. and Development Reports (West Ger.), v. 2, no. 2, 1973 p 69-72
(BLL-Trans-892-(9022.64)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

The life in the flooded middle zone of PSN diodes is determined from the storage charge and from the decay of the voltage after switching off the diode. Both methods give the life of the flooded middle zone under the condition that recombination takes place only in the middle zone. It is shown experimentally that when the concentration of the injected charge carriers is not too high both methods of measurement give the same values for the life. It is concluded that in this concentration range the recombination in the highly-doped edge zones does not play an important part. Author

N75-27249* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MULTIPLE CIRCUIT PROTECTOR DEVICE Patent
George J. Weber, inventor (to NASA) (McDonnell Aircraft Co:, St. Louis) Issued 25 Oct. 1966 6 p Filed 16 Mar. 1964 Sponsored by NASA
(NASA-Case-XMS-02744; US-Patent-3,281,558; US-Patent-Appl-SN-351950; US-Patent-Class-200-129) Avail: US Patent Office CSCL 09A

An in-line, multiple-circuit protector device was designed to be lightweight, compact, accurate, and readily serviced for fuse replacement. The device has the following components and characteristics: a fuse to be used either as a permanent or a temporary part of a system; a line-fuse protector which can be combined with similar devices to protect a multiple-line circuit; an in-line, multiple-circuit connector with a removable fuse to protect the lines being connected; a protective fuse for multiple-line connector devices in which a capsule fuse element of desired capacity may be incorporated; and, a quick disconnected fitting with a fuse element capsule having pushfit pin and socket parts for mating with the two parts of the quick disconnect fitting.
Official Gazette of the U.S. Patent Office

N75-27250* National Aeronautics and Space Administration. Pasadena Office, Calif.
VERY HIGH INTENSITY LIGHT SOURCE USING A CATHODE RAY TUBE Patent
Norman F. Fyler, inventor (to NASA) (Litton Industries, San Carlos, Calif.) Issued 15 Jun. 1965 5 p Filed 31 Jul. 1961 Sponsored by NASA
(NASA-Case-XNP-01296; US-Patent-3,189,784; US-Patent-Appl-SN-127984; US-Patent-Class-315-30) Avail: US Patent Office CSCL 09A

A light source which is much brighter and which lasts for a much shorter time period than strobing light sources is described. A cathode ray tube with a faceplate coated with a phosphor with a relatively short persistency, and a cathode with a broad surface, area, of the same order of magnitude as the area of the faceplate are utilized. In order to focus electrons onto the faceplate, the cathode is preferably concave, of the 'Pierce cathode' type or of other concave form. A grid is provided to control the application of brief pulses of a high intensity electron beam to the phosphor coating. The screen of the cathode ray tube is saturated with an electron beam of high density and high intensity. A phosphor with a relatively short persistency, for light to decay to less than one-half its maximum brightness, is employed. Where electron beam pulse lengths of 10 to 20 nanoseconds are employed, the total duration of the emitted pulse of light will be less than 40 nanoseconds, or less than one twenty-fifth of a microsecond.
Official Gazette of the U.S. Patent Office

N75-27251* National Aeronautics and Space Administration, Washington, D.C.

TRAVELING WAVE SOLID STATE AMPLIFIER UTILIZING A SEMICONDUCTOR WITH NEGATIVE DIFFERENTIAL MOBILITY Patent

Gordon S. Kino (Stanford Univ., Calif.) and Peter N. Robson, inventors (to NASA) (Stanford Univ., Calif.) Issued 29 Dec. 1970 8 p Filed 21 Jun. 1968 Sponsored by NASA
(NASA-Case-HQN-10069; US-Patent-3,551,831; US-Patent-Appl-SN-739072; US-Patent-Class-330-5) Avail: US Patent Office CSCL 09A

A distributed two-port, traveling-wave solid-state amplifier using the transferred electron mechanism in certain semiconductor compounds was designed. Electrodes were alloyed to two ends of a specimen of N-type gallium arsenide and two probes were provided, one to inject an AC signal near the most negative point in the field, and the other to extract the amplified signal near the most positive point in the field, with a gain of 2 to 4 db in the 700 to 1500 mHz frequency range. The amplifier has a region of negative differential mobility in its drift-velocity electric field characteristic as well as means for inhibiting oscillation. Official Gazette of the U.S. Patent Office

N75-27252* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

ELECTROLYTIC CELL STRUCTURE Patent

David F. Putnam (McDonnell-Douglas Corp., Santa Monica, Calif.) and Richard L. Vaughan, inventors (to NASA) (McDonnell-Douglas Corp., Santa Monica, Calif.) Issued 24 Jun. 1975 6 p Filed 8 Feb. 1974 Supersedes N74-29416 (12 - 19, p 2238) Sponsored by NASA
(NASA-Case-LAR-11042-1; US-Patent-3,891,533; US-Patent-Appl-SN-440916; US-Patent-Class-204-267; US-Patent-Class-204-242; US-Patent-Class-204-279; US-Patent-Class-204-286; US-Patent-Class-204-290R) Avail: US Patent Office CSCL 09A

An electrolytic cell is described which consists of a stack of polysulfone plates faced with sheets of platinum. The sheets are bonded by silicone rubber and mechanically secured to their plates by Teflon screws having heads serving as spacers between opposed platinum sheets.
Official Gazette of the U.S. Patent Office

N75-27253# Utah State Univ., Logan. Dept. of Electrical Engineering.

DEVELOPMENT OF A REAL-TIME SPECTRAL SYNTHESIZER Final Report, 1 Dec. 1972 - 30 Jun. 1974

M. Ray Johnson, Alvin M. Despain, and Howard Pollard 31 Jul. 1974 129 p refs
(Contract F19628-73-C-0022; AF Proj. 8603)
(AD-A003679; AFCRL-TR-74-0358) Avail: NTIS CSCL 09/4

Under contract with AFCRL a study of real-time Fourier transform techniques suitable for use in rapid-scan Fourier spectroscopy and Hadamard spectroscopy was initiated. The primary purpose of the study was to develop a method to greatly improve the real-time transforms of only a small spectral window of the total potential spectrum. Thus, the fast Fourier transform was not suitable. This led to further development of the discrete Fourier transform. Several methods were studied and the CORDIC technique was chosen as most suitable. A real-time spectral synthesizer, along with the associated software, was then developed which performs three main functions: (a) time samples are digitized and recorded for future analysis, (b) real time discrete Fourier transforms or Hadamard transforms are taken and (c) the resulting spectra are displayed on a CRT tube at the conclusion of each scan. The synthesizer was designed to interface with an airborne rapid scan far infrared interferometer. GRA

N75-27254*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

THREE PHASE FULL WAVE dc MOTOR DECODER Patent Application

Philip A. Studer, inventor (to NASA) Filed 3 Jun. 1975 17 p
(NASA-Case-GSC-11824-1; US-Patent-Appl-SN-583486) Avail: NTIS HC $3.25 CSCL 09A

A circuit was designed which is capable of providing six-phased output signals for fullwave operation of three-phase dc electronically commutated motors. A schematic diagram of the circuit is given, including a delta resistor network coupled at terminals to three sensors for determining the angular position of a rotor. Six decoding transistors are coupled to the delta network to sense the potential difference across the three resistors in the network. NASA

N75-27255# Technische Universitaet, Brunswick (West Germany).

ON THE ELECTRIC ARC TRAVELLING BETWEEN STATIC AND MOVING ELECTRODES AT ELECTRODE SPEEDS UP TO 110 METERS PER SECOND Ph.D. Thesis [UEBER DEN ZWISCHEN RUHENDEN UND BEWEGTEN ELEKTRODEN WANDERNDEN LICHTBOGEN BEI ELEKTRODENGESCHWINDIGKEITEN BIS 110 M/S]

Lutz Boehme 1974 195 p refs In GERMAN
Avail: NTIS HC $7.00

The effect of electron motion on arcing phenomena is studied by considering operating voltage, streaming velocity, and motion mechanism of the arc. Required levels of field induction and operating voltage for synchronizing traveling arcs are determined by the strengths of magnetic blast fields. Transl. by G.G.

N75-27256# Eidgenossische Technische Hochschule, Zurich (Switzerland).

ON THE KNOWLEDGE OF TURBULENT MATERIAL INTERCHANGE IN ROTATING DISC ELECTRODES Ph.D. Thesis [ZUR KENNTNIS DES TURBULENTEN STOFFAUSTRAUSCHES AN DER ROTIERENDEN SCHEIBENELEKTRODE]

Otmar Dossenbach 1973 86 p refs In GERMAN
(Rept-5078) Avail: NTIS HC $4.75

Electrolytic mass transport on rotating disk- and ring-electrodes was observed in laminar and turbulent flow regions of the system potassium ferricyanide potassium ferrocyanide with soda lye as conducting electrolyte. Experimental and theoretical results showed that turbulent transport to the rotating disk takes place in axial direction and that laminar and turbulent transfer are present above the critical Reynolds number with a pronounced boundary between both flows. This effect diminishes at relative large Reynolds numbers. Transl. by G.G.

N75-27257# Technische Hochschule, Darmstadt (West Germany).

ANGLE ADJUSTMENT OF DIRECT CURRENT MACHINES WITH FREQUENCY ANALOG SIGNAL PROCESSING Ph.D. Thesis [WINKELREGELUNGEN VON GLEICHSTROMMASCHINEN MIT FREQUENZANALOGER SIGNALVERARBEITUNG]

Juergen Lemmrich 18 Apr. 1974 111 p refs In GERMAN
Avail: NTIS HC $5.25

Digital computer control of direct current machines uses frequency analog angular velocity signal processing. A systematic scheme for frequency controlled regulators is provided that contains qualitative descriptions of the various variables in frequency analog tuning control with proportional frequency measurements and rectifier power amplification. Transl. by G.G.

N75-27258# Technische Universitaet, Brunswick (West Germany).

PARTIAL DISCHARGE-PENETRATION OF POLYMER INSULATING MATERIALS BY ALTERNATING VOLTAGES Ph.D. Thesis

Werner Kodoll 24 Jan. 1974 156 p refs In GERMAN; ENGLISH summary
Avail: NTIS HC $6.25

Investigations are presented regarding the breakdown phenomena caused by partial discharges at alternating voltages in polyethylene, filled and unfilled epoxy resin, and polyurethane resin. Several comparative partial discharge measurements are discussed, and results obtained with three different types of samples are described in detail. Investigations were conducted to measure the variation of the partial discharge intensity as a function of time in order to find a correlation between the measured values of intensity and the probability of breakdown. Experiments were conducted to establish the lifetimes of a number of samples under uniform conditions. The evaluation of the measured data by statistical approach gave information about the partial discharge breakdown in the different dielectrics tested. Author

N75-27259# Nagoya Univ. (Japan). Inst. of Plasma Physics.
RELATIVISTIC ELECTRON BEAM SOURCE WITH AN AIR-CORE STEP-UP TRANSFORMER
Akihiro Mohri, Kazunari Ikuta, Masaru Masuzaki, Tetsuya Tsuzuki, Setsuya Fujiwaka, Kenichiro Ukegawa, and Toshiyuki Kato Apr. 1975 18 p refs
(IPPJ-T-23) Avail: NTIS HC $3.25

An air-core step-up transformer with a high coupling factor was developed to generate a high voltage pulse for charging the pulse forming line of a relativistic electron beam source. A beam source using the transformer was constructed and well operated for the beam injection into a toroidal system. Author

N75-27260# Joint Publications Research Service, Arlington, Va.
ANTENNAS
A. A. Pistolkors, ed. 10 Jul. 1975 31 p refs Transl. into ENGLISH from Antenny (Moscow), no. 20, 1974 p 87-96, 100-103, 103-116
(JPRS-65191) Avail: NTIS HC $3.75

The problem of tuning high-directional antennas by the sun was investigated. A description of an antenna for radiointerferometer and a proposal for calculating waveguide H-junction Y-circulators by the circuit theory method are discussed. Author

N75-27261*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ROTATING JOINT SIGNAL COUPLER Patent Application
Walt C. Long, inventor (to NASA) Filed 11 Jul. 1975 9 p
(NASA-Case-LAR-11264-1; US-Patent-Appl-SN-594971) Avail: NTIS HC $3.25 CSCL 09A

A method is described of coupling an electrical signal across the rotating joint of such members as helicopter rotors. A two element capacitor, one element of which rotates with the rotating member and the other element of which is stationary, is used as an integral part of the electrical circuit for such purposes as testing of rotating parts. A rotating capacitor is formed by rotating a circular plate attached to a shaft and a stationary circular plate attached to a stationary member. Together these plates which are appropriately insulated from the members to which they are attached, form a capacitor in the electrical circuit. The electrical circuit for measurement is described in which rotating capacitor isolates the rotating components from the stationary components. The coupler has the ability to transfer information between rotating and stationary portions of an electrical circuit without distortion and without the addition of expensive and critical components. NASA

N75-27262*# Tennessee Technological Univ., Cookeville. Electrical Engineering Dept.
INVESTIGATION OF THE DIFFICULTIES ASSOCIATED WITH THE USE OF LEAD TELLURIDE AND OTHER II - IV COMPOUNDS FOR THIN FILM THERMISTORS Final Report, Jan. 1970 - May 1975
W. D. McLennan May 1975 236 p refs
(Grant NGR-43-003-012)
(NASA-CR-143106) Avail: NTIS HC $7.50 CSCL 09A

The fabrication of thermistors was investigated for use as atmospheric temperature sensors in meteorological rocket soundings. The final configuration of the thin film thermistor is shown. The composition and primary functions of the six layers of the sensor are described. A digital controller for thin film deposition control is described which is capable of better than .1 A/sec rate control. The computer program modules for digital control of thin film deposition processing are included. F.O.S.

N75-27263*# TRW Systems Group, Redondo Beach, Calif.
RESEARCH STUDY ON MULTI-KW-DC DISTRIBUTION SYSTEM Final Report
E. A. Berkery and A. Krausz May 1975 126 p
(Contract NAS8-30778)
(NASA-CR-143896) Avail: NTIS HC $5.75 CSCL 09C

A detailed definition of the HVDC test facility and the equipment required to implement the test program are provided. The basic elements of the test facility are illustrated, and consist of: the power source, conventional and digital supervision and control equipment, power distribution harness and simulated loads. The regulated dc power supplies provide steady-state power up to 36 KW at 120 VDC. Power for simulated line faults will be obtained from two banks of 90 ampere-hour lead-acid batteries. The relative merits of conventional and multiplexed power control will be demonstrated by the Supervision and Monitor Unit (SMU) and the Automatically Controlled Electrical Systems (ACES) hardware. The distribution harness is supported by a metal duct which is bonded to all component structures and functions as the system ground plane. The load banks contain passive resistance and reactance loads, solid state power controllers and active pulse width modulated loads. The HVDC test facility is designed to simulate a power distribution system for large aerospace vehicles. Author

N75-27264*# Xerox Electro-Optical Systems, Pasadena, Calif.
DEVELOPMENT OF A BREADBOARD DESIGN OF A HIGH-PERFORMANCE, HIGH-RELIABILITY SWITCHING REGULATOR Final Report
S. J. Lindena Apr. 1975 105 p Prepared for JPL
(Contracts NAS7-100; JPL-953691)
(NASA-CR-143144; FR-2322) Avail: NTIS HC $5.25 CSCL 09A

A comparison of two potential conversion methods, the series inverter and the inductive energy transfer (IET) conversion technique, is presented. The investigations showed that a characteristic of the series inverter circuit (high equalizing current values in each half cycle) could not be accomplished with available components, and the investigations continued with the IET circuit only. An IET circuit system was built with the use of computer-aided design in a 2, 4, and 8 stage configuration, and these stages were staggered 180, 90, and 45 degrees, respectively. All stages were pulsewidth modulated to regulate over an input voltage range from 200 to 400 volts dc at a regulated output voltage of 56 volts. The output power capability was 100 to 500 watts for the 2 and 8 stage configuration and 50 to 250 watts for the 4 stage configuration. Equal control of up to eight 45 degree staggered stages was accomplished through the use of a digital-to-analog control circuit. Equal power sharing of all stages was achieved through a new technique using an inductively coupled balancing circuit. Conclusions are listed.
Author

N75-27265*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
METHOD AND APPARATUS FOR NEUTRALIZING POTENTIALS INDUCED ON SPACECRAFT SURFACES Patent Application
Robert E. Hunter, inventor (to NASA) Filed 11 Jul. 1975 15 p
(NASA-Case-GSC-11963-1; US-Patent-Appl-SN-595197) Avail: NTIS HC $3.25 CSCL 09C

A potential induced on the surface of an orbiting spacecraft is neutralized to the potential of a plasma through which the spacecraft is traveling by directing charged particles into the plasma from the spacecraft surface. The induced potential occurs in response to bombardment of the spacecraft surface by ambient charged particles which may be negative or positive. The charged particles directed into the plasma from the surface have the same polarity as the induced potential to provide the neutralization. The invention can be utilized to maintain different, electrically isolated segments of a spacecraft surface at the same potential to prevent electric discharges between the different parts and to protect electric circuits within the spacecraft. The invention can also be utilized to enable charged particle detectors on the surface of a spacecraft to operate more accurately so that the particles are not perturbed by a potential difference between the spacecraft surface and the plasma. NASA

N75-27266# Technische Hochschule, Darmstadt (West Germany).
NONLINEAR, CONTROLLABLE CHARGING CURRENT COILS IN HIGH VOLTAGE NETWORKS, PARTICULARLY FOR LIMITING SWITCH OVER VOLTAGE Ph.D. Thesis [NICHTLINEARE, STEUERBARE LADESTROMSPULEN IN HOECHSTSPANNUNGSNETZEN, INSBESONDERE ZUR BEGREENZUNG VON SCHALTUEBERSPANNUNGEN]
Klaus Gappa 23 Apr. 1974 150 p refs In GERMAN
Avail: NTIS HC $5.75

Optimal charge current compensation in high voltage energy

transmission over long distances is obtained by using controllable charging coils for load adjustment. The basic principle of the controllable impedance coil with nonlinear magnetization characteristics is used to develop variable compensation for reactive current in high voltage networks. Transl. by G.G.

N75-27267# Kansas State Univ., Manhattan. Dept. of Mathematics.
CURRENT DISTRIBUTION IN STRIP CONDUCTORS Final Report, 1 Jan. - 30 Nov. 1974
K. S. Yee 1974 77 p refs Sponsored by ERDA
(UCRL-13621) Avail: NTIS HC $4.75

The determination of the dc current distribution on a strip conductor with rectilinear boundary, and the determination of the time dependent and temperature dependent current density on a strip conductor when connected with an external circuit containing in-line inductance and resistance and a capacitor bank were investigated. The study was performed to investigate the physical processes that occur in exploding foils preceding the time of burst. Various theoretical results were derived to yield closed form solution for the dc current distribution on rectilinear conductors. A numerical scheme was constructed to yield the numbers directly from various inputs. Such a code was constructed and tested. A description of the code and its detailed operational instructions are included. A mathematical model for a particularly geometrically-shaped (rectangular) bridge element was investigated. The conductivity of the bridge element is assumed to depend on the temperature caused by the electric heating, and the bridge element is connected to an external circuit to complete the problem. NSA

N75-27268# California Univ., Livermore. Lawrence Livermore Lab.
NUMERICAL ANALYSIS OF PREBURST TEMPERATURES IN AN EXPLODING STRIP CONDUCTOR
J. D. Logan and K. S. Yee Feb. 1975 81 p refs
(Contract W-7405-eng-48)
(UCID-16735) Avail: NTIS HC $4.75

Numerical studies on the magnitude of the electric field in bridgewire conductors and the contribution of that field to the ohmic heating of the bridge element are documented. The investigations explain the processes that occur in exploding foils prior to the time of burst. The uniformity of the bridge element heating over its area was investigated, providing a uniform initiation and propulsion to a flyer plate lying on the element. A bridge element into which a dc current is passed is considered, assuming a constant conductivity. The purpose is to obtain some results of the magnitude of the current density in the bridge in this steady-state situation. A nonlinear problem is considered and the conductivity is allowed to vary as a function of temperature: for this problem the current is time-dependent and the bridge element lies in a circuit with inline resistance and inductance with a capacity discharge unit providing the current surge. The actual temperature in the bridge element was calculated in the latter problem. NSA

N75-27269# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE ELECTRICAL REPAIRMAN'S LIBRARY
I. V. Krikun 4 Dec. 1974 103 p refs Transl. into ENGLISH from Biblioteka Elektromontera (USSR), no. 373, 1973 p 1-80
(AD-A004352; FTD-HC-23-2052-74) Avail: NTIS CSCL 09/3

The brochure contains basic information on grounding and neutral grounding devices, effects connected with the passage of current in the ground, and elementary theoretical conditions. Modern methods of testing grounding and neutral grounding devices and the equipment used for this are described and recommendations on their selection are given. The author gives recommendations on the order of performing tests, evaluating and presenting test results, and also the requirements of the operating regulations and standards for service checking and also the standardized electrical parameters. GRA

N75-27270# EIMAC, San Carlos, Calif.
A VERSATILE LINEAR GRIDDED TUBE CAVITY UHF POWER AMPLIFIER Final Report, 30 Sep. 1973 - 31 Oct. 1974
R. F. Rinaudo, R. I. Sutherland, and W. H. Sain Jan. 1974 39 p refs
(Contract N00123-74-C-0309)
(AD-A004655; EIMAC-TR-74-3) Avail: NTIS CSCL 09/5

A linear UHF broad-band power amplifier, using a type X2135J focused-beam power triode with a double-tubed anode resonator, was designed, built and tested. The X2135J development model was similar to the type 8938 triode but was modified for higher thermal and electrical conductivity. The tube-cavity combination gave 1200 watts of CW output over a minimum instantaneous bandwidth of 11.17 MHz, with 11 to 12 db of gain. The plate efficiency was 54 percent; the amplifier was mechanically tuneable over a 225 to 400 MHz band. Pulse tests were made with more than 12.5 KW output, with 10 percent duty and 10 millisecond pulse width. Pulse power gain was 11.2 to 12.3 db at the 11.2 MHz bandwidth. Linearity (intermodulation distortion) measured by the two-tone method were degraded 10 db at 400 MHz compared to low frequency (2 MHz) results; further effort would be required to assign a cause and improve linearity at UHF frequencies. GRA

N75-27271# Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
SCATTERING FROM A BREAK IN THE SHIELD OF A BRAIDED COAXIAL CABLE THEORY Scientific Interim Report
James R. Wait 4 Nov. 1974 27 p refs
(Contract PRO-Y-71-872; AF Proj. 5635)
(AD-A004872; SR-6; AFCRL-TR-75-0024) Avail: NTIS CSCL 09/1

An important problem in electromagnetic shielding is to evaluate the influence of a non-uniform braid that forms the outer conductor of a coaxial cable. Using two different analytical methods, the effect of a circumferential break in the shield of a cylindrical coaxial structure is considered. In both approaches, the tangential fields are matched across the gap but different assumptions are made. The final results are given in terms of admittance functions that have a relatively simple interpretation. GRA

N75-27272# Office of Telecommunications, Boulder, Colo. Inst. For Telecommunication Sciences.
SCATTERING FROM A BREAK IN THE SHIELD OF A BRAIDED COAXIAL CABLE: NUMERICAL RESULTS Scientific Interim Report
David A. Hill and James R. Wait 23 Dec. 1974 20 p refs
(Contract PRO-Y-71-872; AF Proj. 5635)
(AD-A004871; SR-63; AFCRL-TR-74-0630) Avail: NTIS CSCL 09/1

Some numerical results for the gap admittance and related functions are given for a leaky-feeder type coaxial cable. The radiation pattern is also illustrated for frequencies in the range from 2 to 20 MHz for a sheath transfer inductance with values 0, 4, and 40 nh/m. It is shown that much of the power incident from inside the cable is reflected at the gap but a significant fraction is converted to radiation and surface waves in the external region. GRA

N75-27273# Naval Postgraduate School, Monterey, Calif.
ELECTROMAGNETIC COMPATIBILITY STUDY OF CONDUCTING WIRES M.S. Thesis
Levent Uluc Dec. 1974 37 p refs
(AD-A004235; NPS-52AB74121) Avail: NTIS CSCL 09/1

Assigning probabilities to RF power picked up on aerospace cables at microwave frequencies by using analytical methods was the objective of this thesis. The coupling from radiated fields to typical unshielded wires was calculated in the frequency range 1 GHz to 10 GHz by using a thin wire antenna computer program. The data obtained from the calculations were used to get the cumulative distribution function of absorbed power and also to observe its variation with changing frequency and loading of the wires. The results of this analysis compared favorably with those of a previous experimental approach. This demonstrates that analytical methods can be used for calculating and predicting the coupling from radiated fields to unshielded wires. GRA

N75-27274# RAND Corp., Santa Monica, Calif.
SOVIET RESEARCH AND DEVELOPMENT OF HIGH-POWER GAP SWITCHES

Simon Kassler and Charles D. Hendricks Jan. 1974 44 p refs
(Contract DAHC15-73-C-0181; ARPA Order 189-1)
(AD-A004599; R-1333-ARPA) Avail: NTIS CSCL 20/7

The report was prepared in the course of a continuing study of Soviet research and development of high-current relativistic charge-particle beams. The material in the report deals with Soviet work on the triggered pressurized gap switch, considered by Soviet specialists to be the most critical element of the high-current electron-accelerator design. GRA

N75-27275# British Steel Corp., Sheffield (England).
THE GLOW DISCHARGE LAMP
A. Butterworth Feb. 1975 9 p refs
(PB-240590; GS/Tech/552/1/74/C) Avail: NTIS HC $3.25 CSCL 13A

A glow discharge lamp was fitted to the air stand of an optical emission spectrometer to enable a preliminary assessment of its performance. Experimental work and results are presented along with equipment specifications. Author

N75-27276# National Bureau of Standards, Washington, D.C. Electronic Technology Div.
SEMICONDUCTOR MEASUREMENT TECHNOLOGY: IMPROVED INFRARED RESPONSE TECHNIQUE FOR DETECTING DEFECTS AND IMPURITIES IN GERMANIUM AND SILICON P-I-N DIODES Final Report
A. H. Sher Feb. 1975 29 p refs Sponsored in part by ERDA
(COM-75-10342/4; NBS-Special-Pub-400-13; LC-75-1210) Avail: NTIS; SOD HC as C13.10:400-13 CSCL 18D

An infrared response (RR) technique was evaluated for its utility in qualifying germanium for radiation detector use. Because of several improvements in the sensitivity and interpretation of the technique made during the evaluation, it was possible to observe a number of discrete energy levels lying within the forbidden energy gap of germanium which had passed unobserved in previous studies. These levels correlate with the type of defects and vancancies introduced by radiation damage into germanium as measured using such techniques as photoconductivity and Hall effect measurements after irradiation. Furthermore, the improved infrared response measurement method was used to identify impurities, such as copper, gold, and iron, and dislocations resulting from heat treatments in germanium. GRA

N75-27277# British Steel Corp., Sheffield (England).
METHOD FOR PREDICTING THE RESPONSE OF PHOTOELECTRIC DEVICES TO RADIATION FROM HOT STEEL
R. Senior Feb. 1975 15 p
(PB-240591/8; TB/CO/74/6) Avail: NTIS HC $3.25 CSCL 14B

A method is proposed for determining from fundamental theory the response of a cell to a radiation source at any temperature. This method introduces a new concept, namely 'useful power'. Using the procedure outlined in this method the response of a commercial photodiode is estimated and an experiment to assess the validity of the method is described. GRA

N75-27278# IIT Research Inst., Chicago, Ill.
MICROCIRCUIT GENERIC ENVIRONMENTAL DATA
Oct. 1974 229 p
(Contract F30602-73-C-0065)
(AD-A003618; IITRI-E6251; RAC-MGED-1074) Avail: NTIS CSCL 09/5

The compendium contains environmental test and screen/burn-in results on microcircuit devices. Data are organized according to applied test stress and device generic properties. Aside from a description of the device and stress conditions, each entry reports the number of devices tested, number failed and observed failure modes. A total of 1563 data entries are contained in this monolithic environmental data and screen/burn-in results. This compendium is revised and reissued annually. GRA

N75-27279# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
GENERATION OF TRIANGULAR AND TRAPEZOIDAL VOLTAGES
V. N. Putkov 23 Dec. 1974 12 p refs Transl. into ENGLISH from the Monograph "Vychislitelnaya Tekhnika v Mashinostroienii" Minsk, Dec. 1970 p 193-197
(AD-A004435; FTD-HC-23-2891-74) Avail: NTIS CSCL 14/2

The principles governing the shaping of piecewise-linear time functions based on changes in voltage on a capacitor during charge and discharge are considered. Figures show the circuit of a linear high-speed generator of piecewise-linear voltages and the results of tests. GRA

N75-27178* National Bureau of Standards, Boulder, Colo.
A REVIEW OF PRECISION OSCILLATORS
Helmut Hellwig *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 59-81 refs (For availability see N75-27173 18-31)
CSCL 14B

N75-27182* National Bureau of Standards, Boulder, Colo. Time and Frequency Div.
THE MEASUREMENT OF FREQUENCY AND FREQUENCY STABILITY OF PRECISION OSCILLATORS
David W. Allan *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 109-142 refs (For availability see N75-27173 18-31)
CSCL 09C

N75-27183* National Bureau of Standards, Boulder, Colo. Time and Frequency Div.
MEASUREMENTS OF THE SHORT-TERM STABILITY OF QUARTZ CRYSTAL RESONATORS: A WINDOW ON FUTURE DEVELOPMENTS IN CRYSTAL OSCILLATORS
F. L. Walls and A. E. Wainwright *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 143-157 refs (For availability see N75-27173 18-31)
CSCL 09C

N75-27187* Army Metrology and Calibration Center, Redstone Arsenal, Ala.
FREQUENCY CALIBRATION TECHNIQUES
James M. Williams, Jr. and Joseph M. Rivamonte *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 199-208 (For availability see N75-27173 18-31)
CSCL 17B

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N75-27280 Texas Technological Univ., Lubbock.
MASS TRANSFER IN LIQUID MEMBRANES Ph.D. Thesis
Raymond Douglas Steele 1974 101 p
Avail: Univ. Microfilms Order No. 75-7431

The properties of liquid membranes are studied. Adsorption at an interface was established as the most probable rate controlling event in the mass transfer process. A mathematical model was developed to enable the extension of data collected for single component mass transfer to binary mass transfer, and the use of this model was demonstrated. A previously unknown concentration effect was observed during the formation of liquid membranes. The concentration of a surfactant in a membrane is shown to be greater than the solution from which it was formed. The thickness of liquid membranes was measured and correlated using boundary-layer theory, and the design of liquid membrane diffusion columns was improved. The improved design made possible the collection of data on membrane thickness and the surfactant concentration effect. Dissert. Abstr.

N75-27281 Maryland Univ., College Park.
VERTICAL FLOW OF GAS SOLID SUSPENSIONS PAST MULTI-HOLED PLATES Ph.D. Thesis
Frank Joseph Ventriglio 1974 255 p
Avail: Univ. Microfilms Order No. 75-15783

The flow behavior was investigated of relatively dilute gas-solid suspensions, originating in entraining fluidized systems, and flowing vertically past multi-holed plates placed horizontally in the path of flow. Experimental results are presented along with a theoretical interpretation of the results, based primarily on principles of vertical separation of the particles from the gas in the vicinity of the plate, and repeated particle impaction on, and recoil from the upstream face of a plate. Theoretical curves relating a first order approximation of the particle concentration buildup in the vicinity of the plate, and particle concentration downstream of the plate are presented using four dimensionless parameters which help account for such things as particle diameter, particle initial approach velocity, superficial gas velocity, and such plate characteristics as number of holes and hole diameter. Correlations are presented to relate particle concentrations and velocities initially approaching the plate with theoretical particle concentration buildup under the plate. Dissert. Abstr.

N75-27282 Illinois Univ., Urbana.
RATES OF AUTOMIZATION AND DROP SIZE IN ANNULAR TWO PHASE FLOW Ph.D. Thesis
David Franklin Tatterson 1975 284 p
Avail: Univ. Microfilms Order No. 75-14180

A model was developed from which correlations were developed for the rate of atomization and the resulting parameters in the drop size distribution. Atomization in the annular two-phase flow regime occurs by the removal of small wavelets from the top of roll waves. The model proposes approximating the roll waves by a square wave train and the atomizing wavelets on top of the roll waves by a sinusoidal wave train. Based on this physically simplified picture, a correlation for the rate of atomization was developed. Based on the physical picture of atomization via ligament formation presented by Woodmansee and the fact that the diameter of drops produced by the break-up of a ligament are directly proportional to the ligament diameter, a mathematical analysis is presented, and it is suggested that the drop size distribution produced by the atomization process is upper-limit lognormal, a three parameter distribution. An electronic techniques was used to try to measure drop size. The method was based on charging a drop surface to a high voltage, which causes a pulse in the external circuit. It was found that the pulse height is proportional to the drop diameter.
Dissert. Abstr.

N75-27283 Illinois Univ., Urbana.
TRANSPORT PHENOMENA ASSOCIATED WITH FLOW OVER A SOLID WAVY SURFACE Ph.D. Thesis
Charles Bennett Thorsness 1975 293 p
Avail: Univ. Microfilms Order No. 75-14181

Interactions between the flow and the wave result which occur when turbulent fluid flows over a small amplitude sinusoidal wave are examined. These interactions include fluctuations in the surface shear stress and pressure along the wave which have associated with them a phase and amplitude. Results of the analysis are used to support a linear stability mechanism for the formation of wave patterns in solid surfaces undergoing melting of dissolution. A variety of computational models for the solution of the appropriately linearized momentum equations were examined. The calculations of mass transfer rates to the wavy surface were also performed. It is shown that for certain values of the governing parameters the maxima in the transport rate can be located in the wave trough, and that it is possible to predict the selection of a wavelength which will predominate over others in the patterns formed on dissolving and melting surfaces. Dissert. Abstr.

N75-27284 Delaware Univ., Newark.
APPLICATION OF THE LASER DOPPLER ANEMOMETER TO LAMINAR JET FLOWS, AND ITS POTENTIAL APPLICATION IN NON-NEWTONIAN TURBULENT PIPE FLOWS Ph.D. Thesis
David Meredith Wetzel 1975 203 p
Avail: Univ. Microfilms Order No. 75-14979

Several different laser Doppler anemometers (LDA's) were built and tested. Both the wave analyzer and the phase-locked loop (PLL) circuit were used to detect the LDA signal. The wave analyzer gives the velocity probability function as its ouput. The PLL circuit is an automatic tracking filter with an analog signal output which is proportional to the instantaneous local velocity. The LDA was used to study velocity fields in the exit region of a submerged laminar jet. The LDA was also used to study velocity profiles in turbulent flows of asbestos fiber suspensions in water. It is shown that the LDA can be a useful research tool for studying a wide variety of laminar flows as well as time average velocity fields in turbulent flows. The PLL is a more than adequate instrument for processing time average velocity from the LDA.
Dissert. Abstr.

N75-27285 Virginia Polytechnic Inst. and State Univ., Blacksburg.
TURBULENT STRESS TENSORS IN A THREE-DIMENSIONAL BOUNDARY LAYER Ph.D. Thesis
Cornelius Ikechukwu Ezekwe 1975 253 p
Avail: Univ. Microfilms Order No. 75-15873

Hot film anemometer measurements of the mean velocity field and all six unknown components of the Reynolds stress tensor were made for a three-dimensional turbulent boundary layer. The experimental study was conducted in a channel specifically designed to show features of skewed, pressure-driven turbulent boundary layers. The measurements were made through the boundary layer along a plane of symmetry and off the plane of symmetry of a rectangular T-shaped geometry. The procured mean velocity data and two turbulent shear stresses were compared with values obtained from a numerical solution for the boundary layer flow. The measured and predicted results were in good agreement. The influence of the skew on the flow field was observed through the development and relative magnitudes of various normal and shear turbulent stresses.
Dissert. Abstr.

N75-27286 Washington Univ., St. Louis, Mo.
TIME-DEPENDENT LAMINAR INCOMPRESSIBLE FLOW THROUGH A SPHERICAL CAVITY Ph.D. Thesis
Noorallah V. Gillani 1974 386 p
Avail: Univ. Microfilms Order No. 75-14918

A finite difference numerical solution of the time depedent, nonlinear vorticity transport equation and the coupled linear streamfunction equation was performed explicitly, for the laminar flow of blood, accelerated sinusoidally from rest to the peak of systole, through an axisymmetric spherical cavity in a circular duct (simulating the aortic valve geometry without the cusps). During early systole, the motion of valve leaflets within the spherical geometry was treated based on the assumption that the leaflets present no significant impedance to the flow. An experimental flow visualization study was also carried out in an acrylic model under conditions of approximate goemetric and dynamic similarity to those of the numerical model. Particular emphasis was placed on proper treatment of boundary-region flow through the design and implementation of a hybrid system of finite difference meshes. Dissert. Abstr.

N75-27287 Washington Univ., Seattle.
NUMERICAL SOLUTION FOR THE LAMINAR COMPRESSIBLE FLOW OVER AND WITHIN A CAVITY Ph.D. Thesis
William C. Kessler 1974 267 p
Avail: Univ. Microfilms Order No. 75-14925

The laminar compressible flow over and within a two dimensional cavity was solved using a second-order accurate finite difference algorithm of the time-dependent Navier-Stokes equations. Cavity length to depth ratios of 0.5, 1.0 and 2.0 at a Mach number of 2.0 and a free stream Reynolds number of 7.25x103 per foot were analyzed. The development of the numerical technique for calculating the cavity flow field resulted in the following significant information and solution techniques: (1) an exponential coordinate transformation which permits localized coordinate stretching or compressing of the physical coordinates into rectangular coordinates in the computational plane; (2) a wall pressure boundary condition derived from the normal-to-the-wall time dependent momentum equation; and (3) a solution technique for determining boundary values at sharp

corners. This technique permits flow properties to be double valued at singular points. Dissert. Abstr.

N75-27288 North Carolina State Univ., Raleigh.
THERMAL CAPACITOR DESIGN RATIONALE Ph.D. Thesis
Chong-Kwang Liao 1974 95 p
Avail: Univ. Microfilms Order No. 75-15156

A theoretical analysis was conducted to provide a quantitative understanding of the performance of a thermal capacitor which utilizes a phase change material for heat storage. The total function of the thermal capacitor is divided into a presolidification regime, and a solidification regime. The theoretical analysis was conducted in two parts to determine the internal temperature distribution and the temperature of the circulating coolant at various locations in the coolant passage as a function of time. An integral transform technique was used to solve the heat conduction problem describing the behavior of the capacitor in the presolidification regime. The heat flux at the inner wall of the paraffin chamber is obtained in terms of the wall temperature from the temperature distribution in the liquid phase. Two simultaneous partial differential equations for the wall and coolant temperature were obtained by performing an energy balance on an elemental section of the coolant passage and the passage wall. Dissert. Abstr.

N75-27289 Missouri Univ., Rolla.
SOLID-FLUID DRAG REDUCTION Ph.D. Thesis
Ian Radin 1974 146 p
Avail: Univ. Microfilms Order No. 75-15847

Pressure drop measurements were made on a variety of solid-liquid suspension systems in order to study the effects of particle shape and size, concentration, fluid viscosity, and tube diameter on drag reduction. Measurements were made over a wide range of Reynolds numbers in two tubes: 1/4 inch and 1 inch in diameter. Concentration studies pointed up the need for measurements over a range of flow rates as the relative drag reducing abilities of different concentrations of additives vary with the Reynolds number. The relative dispersing abilities of fluids of different viscosity apparently affect the drag reducing character of the suspensions at high Reynolds numbers more than viscosity. Contrary to results with polymers and soaps, greater drag reduction was obtained in the 1-inch tube than in the 1/4-inch tube at equal suspending fluid Reynolds numbers. Examination of solid-gas suspension data in the literature shows similar flow behavior. It is believed that electrostatic charges on the particles have a major effect on solid-gas friction factor behavior. Dissert. Abstr.

N75-27290 Catholic Univ. of America, Washington, D.C.
HEAT TRANSFER MEASUREMENTS OF CONFINED MONATOMIC, DIATOMIC, AND TRIATOMIC GASES IN THE TRANSITION REGION Ph.D. Thesis
Denis John Curtin 1975 181 p
Avail: Univ. Microfilms Order No. 75-14497

Heat transfer measurements were experimentally performed on several rarefied gases at rest and confined between parallel plates. Helium, neon, argon, nitrogen, and carbon dioxide were tested. Measurements were made with copper plates and gold plated copper plates and three plate spacings, 0.036 cm, 0.0733 cm, and 0.139 cm. Data were taken from the free molecule region to the near continuum region with emphasis on the transition region under linearized conditions where the temperature difference between the plates was much less than the average temperature between the plates. Thermal accommodation coefficients measured in the free molecule region were used with the analytical results of Lees, Zeiring, and Gross-Zeiring for comparison with experimental data. Dissert. Abstr.

N75-27291 Maryland Univ., College Park.
HYDRODYNAMICS OF DROPS IN NEWTONIAN AND NON-NEWTONIAN LIQUID SYSTEMS Ph.D. Thesis
Anil Kohli 1974 178 p
Avail: Univ. Microfilms Order No. 75-15778

The behavior was studied of drops in Newtonian and non-Newtonian (pseudoplastic and dilatant) liquid systems. A spray column assembly was constructed to obtain the experimental data on drop sizes, single drop velocities, streaming drop velocities, and the jetting velocities. The various factors which affect the hydrodynamics of the drops, such as, internal circulation, droplet oscillations, shape of the drop, interaction of the drops with each other, and the formation of wakes were examined. It was found that droplets show coalescence when a pseudoplastic polymer is added to the aqueous solution, and when mass-transfer occurs from the dispersed phase to the continuous phase. Generalized correlations are presented for the Newtonian, polymeric, and dilatant liquid system data. Dissert. Abstr.

N75-27292 Delaware Univ., Newark.
HEAT-TRANSFER AND REACTION MODELING IN MONOLITHIC CATALYSTS Ph.D. Thesis
Roland Harry Heck 1975 197 p
Avail: Univ. Microfilms Order No. 75-14964

Monolithic catalyst supports were subjected to a step change in inlet gas temperature, and the resulting transient thermal responses were measured. A simple one-dimensional model with a constant Nusselt number is adequate to fit the data. The experimental Nusselt numbers fall between the theoretical values for constant wall temperature and for constant wall flux. Reactor models were developed which include the effects of heat and mass transfer, and the reaction kinetics of carbon monoxide oxidation over platinum. The steady-state models show a light-off phenomenon in the channel where there is a jump in temperature and reaction rate. Reactants with Lewis numbers greater than one, such as hydrogen, can lead to a solid temperature that is much higher than the adiabatic temperature rise. Based on the criterion of maximum conversion, the order of perference for monolith channel shapes is squares, triangles, and sinusoids. Dissert. Abstr.

N75-27293# Naval Ordnance Lab., White Oak, Md.
PREDICTION TECHNIQUES FOR REFRACTION OF UNDERWATER EXPLOSION SHOCK WAVES PROGRAMS FOR COMPUTING REFRACTION EFFECTS AND PEAK TRANSLATIONAL VELOCITY
Jean A. Goertner and Ira M. Blatstein 8 Nov. 1974 28 p refs Sponsored by DNA
(DNA Proj. NWED-QAXN)
(AD-A003435; NOLTR-74-142) Avail: NTIS CSCL 19/4

This report describes and lists three computer programs used for studying the refraction of underwater explosion shock waves and the effects of the resultant pressure pulses on submarines submerged in the vicinity of a convergence zone caustic. CONGRATS is a continuous gradient ray tracing program that has been modified for this specific purpose. RAYTRV is a ray sorting program used with CONGRATS. TRANSV constructs pressure pulses for the convergence zone region and determines their effect on submerged targets. GRA

N75-27294*# Virginia Univ., Charlottesville. Dept. of Engineering Science and Systems.
AN EXPERIMENTAL INVESTIGATION OF AN AXISYMMETRIC JET IN A COFLOWING AIRSTREAM
G. D. Catalano, J. B. Morton, and R. R. Humphris Jul. 1975 69 p refs
(Grant NGR-47-005-219)
(NASA-CR-143104; ESS-4043-106-75) Avail: NTIS HC $4.25 CSCL 20D

The flow field of the axisymmetric jet was examined at locations varying from approximately zero to eight diameters downstream of the orifice. Of primary concern at each downstream location was the mapping of the one point statistical properties of the flow, including mean velocity, turbulent intensity, and intermittency. Autocorrelations and power spectral density curves were determined for both the fluctuating velocity field and the concentration signal at various distances from the jet's center line. A laser-Doppler velocimeter, using a phase locked-loop processor, was used to make the desired velocity field measurements which were compared with hot wire anemometer and pressure probe data. To determine the intermittency profiles, velocity-concentration correlations, and concentration power spectra, a laser light scattering technique was employed. Author

N75-27295*# Kanner (Leo) Associates, Redwood City, Calif.
REMARKS ON HYDRODYNAMICS
R. V. Mises Washington NASA Jul. 1975 14 p refs Transl.

into ENGLISH from Z. Angew. Math. Mech. (Berlin), v. 7, 1927 p 425-431
(Contract NASw-2481)
(NASA-TT-F-16444) Avail: NTIS CSCL 20D

The theory of a laminar boundary layer was investigated and included in the general theory of viscous fluids. Calculations were made with an inner flow line (not at an edge), and no assumptions about the motion at the boundary were made. An analogy to heat conduction is presented in order to determine the necessary limit conditions. Author

N75-27296*# National Center for Energy Management and Power, Philadelphia, Pa.
A B-B-G-K-Y FRAMEWORK FOR FLUID TURBULENCE
David Montgomery Jul. 1975 36 p refs Sponsored by NSF
Submitted for publication
(Grant NGL-16-001-043)
(NASA-CR-143101) Avail: NTIS HC $3.75 CSCL 20D

A kinetic theory for fluid turbulence is developed from the Liouville equation and the associated BBGKY hierarchy. Real and imaginary parts of Fourier coefficients of fluid variables play the roles of particles. Closure is achieved by the assumption of negligible five-coefficient correlation functions and probability distributions of Fourier coefficients are the basic variables of the theory. An additional approximation leads to a closed-moment description similar to the so-called eddy-damped Markovian approximation. A kinetic equation is derived for which conservation laws and an H-theorem can be rigorously established, the H-theorem implying relaxation of the absolute equilibrium of Kraichnan. The equation can be cast in the Fokker-Planck form, and relaxation times estimated from its friction and diffusion coefficients. An undetermined parameter in the theory is the free decay time for triplet correlations. Some attention is given to the inclusion of viscous damping and external driving forces. Author

N75-27297*# Boston Univ., Mass. Dept. of Aerospace Engineering.
A FINITE-ELEMENT ANALYSIS FOR STEADY AND OSCILLATORY SUBSONIC FLOW AROUND COMPLEX CONFIGURATIONS
L. T. Chen, E. O. Suciu, and L. Morino Dec. 1974 55 p refs
(Grant NGR-22-004-030)
(NASA-CR-143103; TR-74-02) Avail: NTIS HC $4.25 CSCL 20D

The problem of potential subsonic flow around complex configurations is considered. The solution is given of an integral equation relating the values of the potential on the surface of the body to the values of the normal derivative, which is known from the boundary conditions. The surface of the body is divided into small (hyperboloidal quadrilateral) surface elements, which are described in terms of the Cartesian components of the four corner points. The values of the potential (and its normal derivative) within each element is assumed to be constant and equal to its value at the centroid of the element. The coefficients of the equation are given by source and doublet integrals over the surface elements. Closed form evaluations of the integrals are presented. The results obtained with the above formulation are compared with existing analytical and experimental results. Author

N75-27298# Technische Hogeschool, Delft (Netherlands).
EROSION AND TRANSPORT OF BED-LOAD SEDIMENT Ph.D. Thesis
Rafael Fernandez Luque 1974 102 p refs
Avail: NTIS HC $5.25

The mechanism of bed-load sediment transport is analyzed. The macroequations of mass and linear momentum balance that govern momentum transfer from a Newtonian fluid to rigid particles in a fluid-solid mixture are given. Stability conditions are formulated for a series of experiments which measured: the mean critical bed shear stress at Shields grain-movement condition and at the initiation of non-ceasing scour, the rate of bed-load transport, the average particle velocity, the rate of deposition, and the average length of individual steps of saltating bed-load particles. These experiments were performed in a closed rectangular flow channel using different bed slopes and bed materials. A method was developed that permits determination of the extent of the zone of bulk erosion created locally and instantaneously in a loose granular bed during highly erosive flow. Author

N75-27299# Technische Hogeschool, Delft (Netherlands).
FROST FORMATION: THE INFLUENCE OF FROST FORMATION AND DEFROSTING ON THE PERFORMANCE OF AIR COOLERS Ph.D. Thesis
Carolus Theodorus Sanders 1974 181 p refs
Avail: NTIS HC $7.00

The design and operation of air coolers is studied with particular attention to the effects of frost formation. Two major problems are considered: (1) determining the required cooler surface for given geometry, entrance and exit conditions and mass flow rates, and (2) determining the cooling capacity with given mass flows, entrance conditions, cooler surface and geometry. In both cases, the thickness, surface characteristics and heat resistance of the frost layer play a determining role. The fundamentals of the frost formation process are studied to supply basic information for determining the influence of frost formation on the performance of air coolers. Methods for the calculation of frost formation are presented. The process of defrosting is analyzed and methods for defrosting are classified. The performance of air coolers, when operating under conditions of frost formation, is also discussed. Author

N75-27300# Eidgenossische Technische Hochschule, Zurich (Switzerland).
HEAT TRANSFER IN FLOWING SODIUM: THEORETICAL AND EXPERIMENTAL INVESTIGATIONS ON TEMPERATURE PROFILES AND TURBULENT TEMPERATURE FLUCTUATIONS IN A TUBE Ph.D. Thesis
Hans Fuchs 1974 418 p refs In GERMAN; ENGLISH summary
(Diss-5110) Avail: NTIS HC $10.50

Heat transfer theories for liquid metals were based on velocity data, and temperature distributions are derived by means of the eddy diffusivity concept. A number of theories are critically reviewed; two main areas of uncertainty are identified: choice of appropriate velocity data (inaccurate velocity profiles are the reason for the high Nusselt values which the famous Lyon-Martinelli formula yields), and choice of realistic eddy diffusivity ratios. A review of pertinent experimental data shows that reliable data for sodium is rather scarce. Measurements of temperature profiles in sodium were performed. Temperature profiles, eddy diffusivity for heat, and Nusselt numbers are presented in graphs and tables, and are compared with theoretical calculations. The eddy diffusivity ratio obtained follows quite closely Aoki's relation. Within the above mentioned parameters, temperature fluctuations in sodium were measured with thermocouples of 0.5 mm diameter, and are reported as rms-values, probability density, auto- and cross-correlations and spectral densities. Author

N75-27301# Technische Universitaet, Hanover (West Germany).
CALCULATION OF NONSTATIONARY TEMPERATURE FIELD IN A HIGHLY VISCOUS FLUID DURING HEATING IN A CYLINDRICAL CONTAINER [BERECHNUNG DES INSTATIONAEREN TEMPERATUR-FELDES IN EINEM HOCHVISKOSEN FLUID BEI DER ERWAERMUNG IN EINEM ZYLINDRISCHEN GEFAESS]
Arnold Henckens 1975 137 p refs In GERMAN
Avail: NTIS HC $5.75

An equation system is developed for calculating nonsteady temperature distribution in a heated convective fluid that considers thermo- and hydrodynamic-processes with mass-, energy-, and impulse-transfers as well as temperature dependence on viscosity and heat transfer properties. Transl. by G.G.

N75-27302# Technische Universitaet, Hanover (West Germany).
RESEARCH OF PELTIER ELEMENTS FOR APPLICATION TO THE MEASUREMENT OF LOCAL HEAT TRANSFER COEFFICIENTS [UNTERSUCHUNG EINES PELTIER-ELEMENTS AUF DIE EIGNUNG ZUR MESSUNG VON OERTLICHEN WAERMEUEBERGANGSZAHLEN]
Peter Soll 1973 84 p refs In GERMAN
Avail: NTIS HC $4.75

Theoretical and experimental development work on semiconducting Peltier elements and their usefulness in heat flux measurements and thermoelectric cooling is reported. It is shown

that a current driven through the thermoelectric active soldering point, in the direction of the thermoelectric voltage, extracts heat flux in proportion to the current. Equations are developed for calculating heat energy and heat transfer values from the extracted heat flux. Transl. by G.G.

N75-27303# Technische Universitaet, Hanover (West Germany).
MODEL LAW FOR FRICTION PRESSURE DISSIPATION IN TWO PHASE FLOW Ph.D. Thesis [MODELLGESETZ FUER DEN REIBUNGSDRUCKVERLUST IN DER ZWEIPHASEN-STROEMUNG]
Lutz Friedel 1974 192 p refs In GERMAN
Avail: NTIS HC $7.00

Theoretical and experimental studies are reported to determine transfer conditions for two phase friction pressure loss from a model fluid to the original fluid. Comparison of systematic measurements on cryogenic pipe flows with a dimensional approximative model for two phase flow shows that adequate accuracy is obtained when three dimensionless characteristic quantities are simultaneously included in the model and the original fluid flow. These characteristics are thermodynamics of both fluids, flowing mass vapor content, and dependency between mass flow density and geometries of model and original. Transl. by G.G.

N75-27304*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EXPERIMENTAL EVALUATION OF JOINT DESIGNS FOR A SPACE-SHUTTLE ORBITER ABLATIVE LEADING EDGE
Stephen S. Tompkins and Walter P. Kabana Washington Jul. 1975 38 p refs
(NASA-TM-X-3230; L-10020) Avail: NTIS HC $3.75 CSCL 22B

The thermal performance of two types of ablative leading-edge joints for a space-shuttle orbiter were tested and evaluated. Chordwise joints between ablative leading-edge segments, and spanwise joints between ablative leading-edge segments and reusable surface insulation tiles were exposed to simulated shuttle heating environments. The data show that the thermal performance of models with chordwise joints to be as good as jointless models in simulated ascent-heating and orbital cold-soak environments. The suggestion is made for additional work on the joint seals, and, in particular, on the effects of heat-induced seal-material surface irregularities on the local flow. Author

N75-27305*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A SHORT STATIC-PRESSURE PROBE DESIGN FOR SUPERSONIC FLOW
S. Z. Pinckney Washington Jul. 1975 37 p refs
(NASA-TN-D-7978; L-10033) Avail: NTIS HC $3.75 CSCL 20D

A static-pressure probe design concept was developed which has the static holes located close to the probe tip and is relatively insensitive to probe angle of attack and circumferential static hole location. Probes were constructed with 10 and 20 deg half-angle cone tips followed by a tangent conic curve section and a tangent cone section of 2, 3, or 3.5 deg, and were tested at Mach numbers of 2.5 and 4.0 and angles of attack up to 12 deg. Experimental results indicate that for stream Mach numbers of 2.5 and 4.0 and probe angle of attack within + or - 10 deg, values of stream static pressure can be determined from probe calibration to within about + or - 4 percent. If the probe is aligned within about 7 deg of the flow experimental results indicated, the stream static pressures can be determined to within 2 percent from probe calibration. Author

N75-27306*# Boston Univ., Mass. Dept. of Aerospace Engineering.
A FINITE-ELEMENT ANALYSIS FOR STEADY AND OSCILLATORY SUPERSONIC FLOWS AROUND COMPLEX CONFIGURATIONS
Luigi Morino and Lee-tzong Chen Dec. 1974 68 p refs
(Grant NGR-22-004-030)
(NASA-CR-143099; TR-74-03) Avail: NTIS HC $4.25 CSCL 20D

The problem of small perturbation potential supersonic flow around complex configurations is considered. This problem requires the solution of an integral equation relating the values of the potential on the surface of the body to the values of the normal derivative, which is known from the small perturbation boundary conditions. The surface of the body is divided into small (hyperboloidal quadrilateral) surface elements, sigma sub i, which are described in terms of the Cartesian components of the four corner points. The values of the potential (and its normal derivative) within each element is assumed to be constant and equal to its value at the centroid of the element, and this yields a set of linear algebraic equations. The coefficients of the equation are given by source and doublet integrals over the surface elements, sigma sub i. The results obtained using the above formulation are compared with existing analytical and experimental results. Author

N75-27307# Kiel Univ. (West Germany).
MEASUREMENT OF GAS IMPEDANCE PRESSURE DEPENDENCE OF ARGON BY TRANSVERSE QUARTZ OSCILLATORS Ph.D. Thesis [MESSUNG DER DRUCKABHAENGIGKEIT DER GASIMPEDANZ VON ARGON MITTELS QUARZSCHERSCHWINGERN]
Torsten Hauberg 1973 68 p refs In GERMAN
Avail: NTIS HC $4.25

Pressure measurements by quartz oscillator frequency depend on its elastic tensor and the mechanical impedance exerted by the surrounding gas pressure. Transl. by G.G.

N75-27308# Technische Hochschule, Darmstadt (West Germany).
PRESSURE LOSS AND HEAT TRANSFER IN ALIGNED, OFFSET, AND PARTIALLY OFFSET CROSS FLOW IN TUBE BANKS Ph.D. Thesis [DRUCKVERLUST UND WAERMEUEBERGANG BEI FLUCHTENDEN, VERSETZTEN UND TEILVERSETZTEN QUERANGESTROEMTEN ROHRBUENDELN]
Werner Niggeschmidt 1975 132 p refs In GERMAN
Avail: NTIS HC $5.75

Considered are partly offset pipe bank flows from linear to offset arrangements for their pressure dissipation and heat transfer characteristics. Stepwise adjustments stagger pipes in each second row crosswise to flow direction, or linear to flow direction. Pressure losses are determined through energy dissipation in the flow medium caused by friction and eddy formation as well as by symmetry conditions and pipe arrangement in the bundle. Heat transfer in all bundle arrangements depends mostly on the longitudinal division ratio. Transl. by G.G.

N75-27309# Technische Universitaet, Munich (West Germany).
RESEARCH ON THE AIR RESISTANCE AND THE VELOCITY FIELD OF CYLINDRICAL INCIDENTAL BODIES TRAVELING IN TUBES (CONDUITS) WITH LARGE OBSTRUCTIONS OF THE TUBE CROSS SECTIONS Ph.D. Thesis [UNTERSUCHUNGEN UEBER DEN LUFTWIDERSTAND UND DAS GESCHWINDIGKEITSFELD VON BEWEGTEN ZYLINDRISCHEN NEBENKOERPERN IN ROHREN (ROHRFAHRZEUGE) BEI GROSSER VERSPERRUNG DES ROHRQUERSCHNITTS]
Erwin Lukas 5 Mar. 1974 29 p refs In GERMAN
Avail: NTIS HC $3.75

A mathematical model is used to calculate the air resistance of a cylindrical body traveling in a tubular casing with various geometrical parameters. Experimental results on resistance and slot velocity distribution measurements correlate with calculations. It is concluded that a simple theoretical model adequately describes air resistance for a large region of tube obstruction. Transl. by G.G.

N75-27310*# Pennsylvania State Univ., University Park. Dept. of Aerospace Engineering.
COMPRESSOR AND FAN WAKE CHARACTERISTICS Semiannual Progress Report, period ending 30 Jun. 1975
B. Lakshminarayana Jul. 1975 10 p refs
(Grant NsG-3012)
(NASA-CR-143172) Avail: NTIS HC $3.25 CSCL 20D

Approaches for developing an analytical model capable of determining the effects of rotor flow and blade parameters and turbulence properties (i.e. energy, velocity correlations, and length scale) on the rotor wake characteristics and its diffusion properties

are discussed. The three-dimensional model will employ experimental measurements, instantaneous velocities, and turbulence properties at various stations downstream from a rotor. A triaxial probe and a rotating conventional probe, which is mounted on a traverse gear operated by two step motors, are to be used for these measurements. The final rotor wake model will be capable of predicting the discrete and broadband noise generated in a fan rotor and of evaluating the aerodynamic losses, efficiency and optimum spacing between a rotor and stator in turbomachinery. Author

N75-27311# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
EXPERIMENTAL STUDY OF EVAPORATION HEAT TRANSFER IN A FALLING FILM
P. Abou and J. Huyghe [1974] 18 p refs Presented at the Symp. on Multi-Phase Flow Systems, Glasgow, 2 Apr. 1974
(CEA-Conf-2756; Conf-7404101-1) Avail: ERDA Depository Libraries HC $4.00

The local heat transfer coefficient for the evaporation of water falling in a film was studied experimentally. Tests were made with electrically heated tubes 3.6 m long and of 28.5 and 36 mm inside diameter. The temperature varied from 40 to 110 C, the linear mass flow rate from 0.5 to 1.5 kW/ms and the heat flux from 15 to 75 kW/m sq. Simultaneous measurements of the wall temperature of the tube and of the pressure drop inside of it were made. The results are correlated by the way of dimensionless parameters: the Nusselt and Prandtl numbers of the film, and both Reynolds numbers of the film and of the core of vapor. Author

N75-27312# Argonne National Lab., Ill.
ANALYSIS OF EXTENSIBLE CURVED PIPES CONVEYING FLUID
S. S. Chen Jan. 1975 29 p refs
(Contract W-31-109-eng-38)
(ANL-CT-75-28) Avail: NTIS

A linear theory is presented to account for the motions of extensible curved pipes conveying fluid. Hamilton's principle was used to derive the equations of motions and the boundary conditions. Based on the theory, the flow-induced deformations are obtained in closed form. The natural frequency was also studied, and it is shown that the frequency decreases with increasing flow velocity. As the velocity approaches a certain value, the pipe loses stability by buckling. The critical flow velocity is calculated for two types of pipe end conditions.
Author (NSA)

N75-27313# Naval Postgraduate School, Monterey, Calif.
REFINEMENTS OF THE SEAL SUBROUTINES AND FAN AIR FLOW MAPS FOR THE XR-3 LOADS AND MOTION PROGRAM M.S. Thesis
Robert Alexander Finley Dec. 1974 145 p refs
(AD-A004616) Avail: NTIS CSCL 13/10

Refinements to the bow and stern seal subroutines of the XR-3 Loads and Motion computer program are made. New lift fan performance maps are developed and presented. Comparison studies of simulated performance of the original XR-3 model with the old and new fan maps are made under varying sea conditions. Measured roll and pitch transient behavior of the XR-3 test craft in calm water is compared with the simulated response of both the original and the new model. In addition, simulated performances of the original and new models in irregular ahead seas are compared. GRA

N75-27314# Aerospace Corp., El Segundo, Calif.
ON THE UPPER BOUNDING APPROACH TO THERMAL CONVECTION AT MODERATE RAYLEIGH NUMBERS. 2: RIGID BOUNDARIES Interim Report
Joe M. Straus 6 Jan. 1975 38 p refs
(Contract F04701-74-C-0075)
(AD-A004833; TR-0075(5260)-2; SAMSO-TR-75-7) Avail: NTIS CSCL 20/4

Numerical solutions for two upper bounding problems for thermal convection in a horizontal layer of fluid contained between perfectly conducting rigid boundaries are presented. Problem 1 was first introduced by Howard (1963) and yields an upper bound on the heat transport which is independent of Prandtl number. The numerical solutions of this problem indicate that this boundary layer approach overestimates this upper bound somewhat. Solutions are investigated for three horizontal wavenumbers. Problem 2, which is valid for large Prandtl number fluids, yields an upper bound on the heat transport which is smaller than that given by Problem 1. The transitions involved are discussed. GRA

N75-27315# Applied Theory, Inc., Los Angeles, Calif.
ITERATIVE SOLUTION OF THE EQUATIONS FOR STEADY VISCOUS COMPRESSIBLE FLOW, BASED ON SIMILITUDE Final Report, 1 Jun. 1972 - 1 Jun. 1974
J. G. Trulio and H. N. Yeung Nov. 1974 48 p refs
(Contract F33615-72-C-1780; AF Proj. 7064)
(AD-A004806; ARL-74-0138) Avail: NTIS CSCL 20/4

A study was made of an iterative procedure for solving numerically the equations of steady viscous compressible flow. The method, based on a principle of similitude, was tested for the case of laminar two-dimensional hypersonic flow into a compression corner. The first two iterations gave an accurate description of the boundary layer, using less than 1 percent of the computer time required for time-marching integration of the equations for transient two-dimensional flow. However, the equations of the third iteration, in which development of separated flow and recirculation was to have begun, proved unstable. A plausible explanation for the unstable behavior of the third iterate was found. On that basis, alternate equations were developed that may permit stable iteration. GRA

N75-27316# Ohio State Univ., Columbus. Aeronautical and Astronautical Research Lab.
PARTICLE CONCENTRATIONS IN HIGH MACH NUMBER, TWO PHASE FLOWS Final Report, 1 Jan. 1973 - 1 Jan. 1974
K. D. Korkan, S. L. Petrie, and R. J. Bodonyi Jul. 1974 126 p refs
(Contract F33615-73-C-4012; AF Proj. 7065)
(AD-A004767; ARL-74-0102) Avail: NTIS CSCL 20/4

The behavior of solid particles in high speed flow systems was studied. A drag coefficient correlation which allows greater accuracy in the prediction of particle trajectories over a wide range of slip Mach number and slip Reynolds number was formulated. A variety of two phase flow situations was investigated along with the effect of different gases and different particles on the two phase flow. The exploratory experimental studies conducted in this investigation substantiate that a test facility suitable for the study of particle trajectories has been developed and that accurate particle concentration profiles can be obtained with the laser scattering technique. GRA

N75-27317# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CERTAIN MODIFICATIONS OF GASODYNAMICAL TOTAL IMPULSE FUNCTIONS
B. S. Vinogradov 26 Nov. 1974 18 p refs Transl. into ENGLISH from Tr. Aviats. Inst. (Kazan), no. 133, 1971 p 72-81
(AD-A004348; FTD-HC-23-1486-74) Avail: NTIS CSCL 20/4

In the study it is shown how the gasodynamical functions are modified if they are used for calculating the total impulse flow of a plane boundary layer given an arbitrary orientation of the reference surface. Moreover, gasodynamical functions are derived for two-layer flows consisting of a boundary layer and a homogeneous layer of some thickness taken in a streamline flow or at the nucleus. GRA

N75-27318# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FEATURES OF THE TURBULENT MIXING OF A CIRCULAR JET WITH A TRANSVERSE INCOMPRESSIBLE FLOW
S. T. Kashafutdinov 27 Nov. 1974 18 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Sibirskoe Otd., Ser. Tekhn. Nauk (USSR), v. 13, no. 3, 1971 p 14-21
(AD-A004392; FTD-MT-24-1810-74) Avail: NTIS CSCL 20/4

The interaction of gas jets with air cross flow was investigated, and experiments were conducted to determine the degree of turbulent mixing of the air from the flow with the substance of the jet. Results were compared with experimental data on the

distribution of pressures on the plane from which the jet escapes. It was found that the degree of mixing increases with a decrease in the relative momentum of the jet. M.J.S.

N75-27319# Flow Research, Inc., Kent, Wash.
THE EFFECT OF AXISYMMETRIC GEOMETRY ON BOUNDARY-LAYER TRANSITION AS PREDICTED BY LINEAR STABILITY THEORY
C. L. Merkle, D. R. S. Ko, and T. Kubota Sep. 1974 30 p refs
(Contract F44620-74-C-0049)
(AD-A004787; Flow-Res-39; AFOSR-75-0192TR) Avail: NTIS CSCL 20/4

Computations of the linear stability of laminar boundary layers have been used to obtain predictions of the ratio of the transition Reynolds number on a cone to that on a flat plate. The results show that this ratio is not given by a simple constant, but depends upon various parameters. In particular, the predictions indicate that transition will not occur at the same value of Reynolds number(deflected flow) on both the cone and the plate. Similarly, the results show that the ratio of transition Reynolds numbers is not equal to the ratio of the critical Reynolds numbers for the two bodies. If either of these suppositions were true, the transition Reynolds number ratio would be three; stability results indicate that this ratio can be less than unity. Among other things, the ratio depends upon the disturbance level in the free-stream. High free-stream disturbances push the ratio near three, while sufficiently small disturbances allow transition to occur earlier on the cone than on the plate. This is a consequence of the fact that on a plate the transition location is more sensitive to free-stream disturbances than it is on a cone. GRA

N75-27320# New York Univ., N.Y. Center for Interdisciplinary Programs.
INVESTIGATION OF BOUNDARY LAYER SHOCK INTERACTION AT TRANSONIC SPEED Final Report, 1 Jun. 1972 - 1 Sep. 1973
Sergio Panunzio Jul. 1974 63 p refs
(Contract F33615-72-C-1992; AF Proj. 7065)
(AD-A004811; Rept-7405; ARL-74-0114) Avail: NTIS CSCL 20/4

The report describes the design of a facility for studying experimentally the flow field at transonic speed above and near a wing profile, with the objective of determining the supersonic expansion wave-shock configuration. A two-dimensional flow field is considered and a rectangular wing profile, folded into an axially symmetric ring, is used as a model. Test Reynolds numbers are to about 100 million. Modification of the flow field is introduced with (a) variable plenum chamber pressure around the slotted-porous tunnel wall and (b) a mechanism for changing porosity distribution on the slotted wall. Preliminary tests to determine flow uniformity and influence of the variable porosity mechanism are reported. GRA

N75-27321# ARO, Inc., Arnold Air Force Station, Tenn.
PROFILE OF AN ANISENTROPIC NITROGEN NOZZLE EXPANSION Final Report, 1 Jul. 1973 - 30 Jun. 1974
J. W. L. Lewis and W. D. Williams AEDC Feb. 1975 44 p refs
(AD-A004764; AEDC-TR-74-114; ARO-VKF-TR-74-77) Avail: NTIS CSCL 20/4

Hypersonic N2 flow fields were produced using a conical nozzle of 1.04-mm throat diameter and an exit plane area ratio of 13.4. The reservoir pressure was varied over the range of from 1.87 to 13.6 atm at the reservoir temperature of 285 K, and the reservoir conditions were such that both isentropic and anisentropic conditions existed within the axial region investigated. Axial and radial profiles of N2 number density and rotational temperature were measured using laser Raman scattering, and comparisions are presented with the method of characteristics isentropic prediction. The onset of condensation and subsequent cluster growth were observed using laser Rayleigh scattering and depolarization measurements as well as photographic recording. The Rayleigh and Raman scattering data were used to obtain estimates of the axial variation of the cluster size as well as the variation of the depolarization ratio with the mean number of molecules of the cluster. GRA

N75-27322# Iowa Univ., Iowa City. Dept. of Mechanics and Hydraulics.
TRANSVERSE MIXING OF HEATED EFFLUENTS IN OPEN CHANNEL FLOW Ph.D. Thesis
Tso-Ping Yeh May 1974 200 p refs
(Contract DI-14-31-0001-3692)
(PB-240302/0; W75-05657; OWRT-A-040-IA(4)) Avail: NTIS HC $7.00 CSCL 13B

The transverse mixing process was investegated for a buoyant effluent in both near and far field regions of an open-channel flow. A set of laboratory flume experiments was performed, covering a range from very rapidly mixing flows to nearly stably stratified flows. A heated effluent was introduced continuously into the flume over the depth of flow at the average ambient velocity from a source located at either the centerline or one side. Detailed measurements of the temperature distribution were obtained at several downstream cross sections. For some selected representative flow conditions, velocity profiles for both longitudinal and lateral components were measured. The results show that the mixing process is closely related to the development and decay of buoyancy-generated secondary flow. GRA

N75-27323# Iowa State Univ. of Science and Technology, Ames. Heat Transfer Lab.
ANALYSIS OF COMBINED FORCED AND FREE LAMINAR CONVECTION IN HORIZONTAL TUBES
S. W. Hong and A. E. Bergles Nov. 1974 165 p refs
(Grant NSF GK-36851)
(PB-240496/0; ISU-ERI-AMES-74155) Avail: NTIS HC $6.25 CSCL 13A

Laminar flow heat transfer with uniform heat flux in horizontal circular tubes was analyzed to determine the effect of buoyancy on heat transfer in the thermal entry region and the effects of temperature-dependent properties (density and viscosity) on heat transfer in the fully-developed region. A solution for heat transfer in the entrance region of circular tubes was carried out assuming that the wall heat flux is uniform circumferentially and axially. The results indicate that the traditional constant property thermal entrance region solutions are valid only for very low heat fluxes associated with low Rayleigh numbers (less than 1000). At higher Rayleigh numbers, the Nusselt number in the fully-developed region is about 200 percent above the constant property value. GRA

N75-27324# National Oceanic and Atmospheric Administration, Silver Spring, Md. Air Resources Lab.
WASTE HEAT DISPOSAL FROM NUCLEAR POWER PLANTS
Ralph M. Rotty Sep. 1974 33 p refs
(COM-75-10407/5; NOAA-TM-ERL-ARL-47;
NOAA-75032102) Avail: NTIS HC $3.75 CSCL 18E

The global consumption of energy has been growing exponentially at a rate of 5.4 percent per year. In accord with the second law of thermodynamics, all electrical power generation cycles must reject heat, and as larger and larger amounts of electricity are needed, larger amounts of heat must be rejected. The quantity of reject heat is rapidly approaching a level at which its impact on the atmosphere cannot be neglected. Possible intensification of convective activity and associated concentration of vorticity may be caused by concentrating large amounts of heat rejection in small areas. The type of cooling employed at a given power generation site has a major effect on the heat flux per unit of area. Once-through cooling is recommended. GRA

N75-27325# Connecticut Univ., Storrs.
COMBINED BUOYANCY AND BOUNDARY EFFECTS ON THE TRAJECTORY OF A TWO DIMENSIONAL JET Ph.D. Thesis
Michael Hunter Stenhouse 1974 163 p refs
(Contract DI-14-31-0001-3507)
(PB-240475/4; W75-05780) Avail: NTIS HC $6.25 CSCL 20D

Experimental data on a two-dimensional jet issuing parallel to an offset surface are presented and used as the basis for an analytical method to predict the jet centerline trajectory, reattachment point, recirculation region pressure distribution, and offset surface pressure distribution. A two-dimensional water jet issuing horizontally in the proximity of a free (air-water interface)

offset surface was studied. Hot film anemometry was used to determine the speed distribution in the jet and recirculation regions for a nonheated jet. Streamlines, jet centerline, reattachment point, and surface deflection for both nonheated and heated jets were recorded photographically using a microbubble flow visualization technique. Thermistor sensor temperature probes were used to record the temperature history of the heated jets. GRA

N75-27326# Iowa State Univ. of Science and Technology, Ames. Heat Transfer Lab.
AUGMENTATION OF LAMINAR FLOW HEAT TRANSFER IN TUBES BY MEANS OF TWISTED-TAPE INSERTS Interim Report
S. W. Hong and A. E. Bergles Dec. 1974 133 p refs
(Grant NSF GK-36851)
(PB-240497/8; ISU-ERI-AMES-75011; HTL-5) Avail: NTIS HC $5.75 CSCL 13A

In order to define the lower bound of the test results, an analysis of heat transfer in the entrance region of semi-circular tubes was carried out. Laminar flow heat transfer in the thermal entrance region of semi-circular tubes is solved numerically for constant property fluid flow and two tube wall boundary conditions, which represent the limits encountered in practice. The asymptotic Nusselt numbers are 6.724 and 5.172 for the two boundary conditions. Heat transfer coefficients for laminar flow in a metal tube with two twisted-tape inserts were determined experimentally. Nusselt number is shown to be a function of tape twist ratio, Reynolds number, and Prandtl number. Several hundred percent improvement in heat transfer coefficient over the empty tube value was achieved, with the increase dependent on flow and heating conditions. GRA

N75-27327# Naval Postgraduate School, Monterey, Calif.
EXPERIMENTAL INVESTIGATION OF GROUND EFFECTS ON A HEATED CYLINDER IN CROSSFLOW M.S. Thesis
Jon Philip McComas Dec. 1974 67 p refs
(AD-A004240) Avail: NTIS CSCL 20/4

The fluid flow and forced convective heat transfer characteristics of a uniformly heated right circular cylinder resting on a flat plate in a crossflow of air were experimentally investigated. The circumferential variation of the Nusselt number on the cylinder surface was obtained at Reynolds numbers ranging from 53,000 to 153,000 using a liquid crystal thermographic technique. Pressure coefficients were obtained at five-degree intervals around the cylinder circumference at Reynolds numbers of 105,000 and 156,000. Flow visualization was conducted at a Reynolds number of 10,000 in order to qualitatively examine the flow field. A qualitative theory based upon a compilation of previous results reported for flow around a free cylinder and flow over forward and rear-facing steps was developed. GRA

N75-27457# Joint Publications Research Service, Arlington, Va.
HEAT TRANSFER FROM A WAVY SURFACE WITH UNSTABLE STRATIFICATION
V. N. Domanov and V. I. Zhadan *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 65-72 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 55-61 (For availability see N75-27450 18-42)

N75-27459 Joint Publications Research Service, Arlington, Va.
STUDY OF THE TURBULENCE OF A ROUGH CURRENT WITH INCREASED BOTTOM IRREGULARITY
N. A. Mikhaylova and D. N. Nabotov *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 85-92 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 71-76 (For availability see N75-27450 18-42)

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N75-27328* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
REAL TIME, LARGE VOLUME, MOVING SCENE HOLOGRAPHIC CAMERA SYSTEM Patent
Robert L. Kurtz, inventor (to NASA) Issued 10 Jun. 1975 15 p Filed 10 Aug. 1973 Supersedes N74-28932 (12 - 18, p 2174)
(NASA-Case-MFS-22537-1; US-Patent-3,888,561; US-Patent-Appl-SN-387266; US-Patent-Class-350-3.5) Avail: US Patent Office CSCL 14E

A holographic motion picture camera system is described which produces resolution of front surface detail. The system utilizes a beam of coherent light and means for dividing the beam into a reference beam for direct transmission to a conventional film transport, and three reflection signal beams for transmission to the film transport by reflection from the three orthogonal sides of a moving scene. The system is arranged so that critical parts of the system are positioned on the foci of three interrelated mathematically-derived ellipses. The camera has the theoretical capability of producing motionpicture holograms of an object moving at speeds as high as 900,000 cm/sec (about 21,450 mph). The system has the capability of handling objects of relatively large volume moving in a random direction anywhere within a volume.
Official Gazette of the U.S. Patent Office

N75-27329* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
METHOD AND APPARATUS FOR VIBRATION ANALYSIS UTILIZING THE MOSSBAUER EFFECT Patent
Norbert A. Roughton, inventor (to NASA) (Rockwell Intern. Corp., Canoga Park, Calif.) Issued 8 Jul. 1969 9 p Filed 11 Mar. 1966 Sponsored by NASA
(NASA-Case-XMF-05882; US-Patent-3,454,766; US-Patent-Appl-SN-533650; US-Patent-Class-250-83.3) Avail: US Patent Office CSCL 14B

An apparatus and method are described for analyzing or calibrating the vibratory motion characteristics of a transducer utilizing the Mossbauer effect. The energy and density are sampled at preselected times with reference to the alternating motion of a Mossbauer gamma ray source attached to the transducer.
Official Gazzette of the U.S. Patent Office

N75-27330* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AUTOMATIC MICROBIAL TRANSFER DEVICE Patent
Judd R. Wilkins and Stacey M. Mills, inventors (to NASA) Issued 20 May 1975 5 p Filed 26 Oct. 1973 Supersedes N74-10422 (12 - 01, p 0053)
(NASA-Case-LAR-11354-1; US-Patent-3,884,765; US-Patent-Appl-SN-409990; US-Patent-Class-195-127; US-Patent-Class-195-141; US-Patent-Class-195-120; US-Patent-Class-195-103.5R) Avail: US Patent Office CSCL 14B

An apparatus is disclosed for automatically transferring a predetermined amount of inoculated culture from a first container into a second container having a sterile culture therein. The containers rest on the top of a pivoted support surface, and a horizontally disposed conduit connects them. The support surface is pivoted from its normal horizontal position by a solenoid which is activated under the control of an electrical timer. When the solenoid is inactive, the catch is connected to the first end of the support surface to hold it in its normal horizontal position. When the solenoid is activated, the catch releases the support surface into a freely pivoting state; a weight disposed on the second end of the support surface tips the support surface from its normal horizontal position causing the predetermined volume

of inoculated culture to flow from the first container through the horizontally disposed conduit and into the second container having sterile culture therein.
Official Gazette of the U.S. Patent Office

N75-27331* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
IMPACT POSITION DETECTOR FOR OUTER SPACE PARTICLES Patent
Siegfried O. Auer, inventor (to NASA) (NAS-NRC) Issued 24 Jun. 1975 12 p Filed 30 Aug. 1974 Supersedes N74-32886 (12 - 22, p 2694) Sponsored by NASA
(NASA-Case-GSC-11829-1; US-Patent-3,891,851; US-Patent-Appl-SN-502136; US-Patent-Class-250-385) Avail: US Patent Office CSCL 14B

The impact position of cosmic dust, micrometeoroids and other similar outer space particles is detected with an array including a multiplicity of mutually insulated, metal electrode strips, a first group of which has parallel, longitudinal axes at right angles to a second group of the strips. Also provided is a delay line having a multiplicity of taps, each of which is connected to one of the strips. The delay times between adjacent taps of the delay line are approximately the same. One end of the delay line is terminated with a resistor having a value substantially equal to the characteristic impedance of the delay line. The arrival time at a delay line output terminal of pulses induced in the delay line in response to particle impact is determined relative to the occurrence time of a further pulse derived in response to the impact. Circuitry is provided to separate pulses induced in the line from different strips, evan though there are substantially simultaneous impacts on the different strips.
Official Gazette of the U.S. Patent Office

N75-27332*# Scientific Translation Service, Santa Barbara, Calif.
CURRENT STATE AND TRENDS IN THE DEVELOPMENT OF ANALYTICAL INSTRUMENT DESIGN
D. L. Orshanskiy, V. A. Pavlenko, and M. D. Shutov Washington NASA Jun. 1975 20 p refs Transl. into ENGLISH from Nemzetkozi Merestech. Konf. Kozlemenyei (Budapest), 1959 p 289-306 (Russian Language Document)
(Contract NASw-2483)
(NASA-TT-F-16395) Avail: NTIS HC $3.25 CSCL 14B

The importance of analytical instruments is evaluated and their progressive role in the further development of science and technology is discussed. A detailed classification of analytical instrument design is presented. Author

N75-27333*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
DEVELOPMENT, FABRICATION AND CALIBRATION OF A POROUS SURFACE MICROPHONE IN AN AEROFOIL
D. U. Noiseux, N. B. Noiseux, and Y. Kadman [1975] 211 p refs
(Contract NAS1-12672)
(NASA-CR-132636) Avail: NTIS HC $7.25 CSCL 14B

The development of a porous surface microphone in an airfoil intended to measure acoustic signals in a turbulent airflow and to minimize the flow noise is described. The sensor because of its airfoil operates over a wide range of yaw angles and flow velocities without excessive flow noise. The acoustic properties of the porous materials used in the airfoil sensor and their effects on the frequency response of the sensor were analyzed and tested. An accurate airfoil was selected, having a smaller thickness-to-chord ratio and an airfoil sensor was designed. The sensor was calibrated acoustically and its flow noise evaluated in the quiet BBN wind tunnel at flow velocities up to 70 m/sec. Results are presented. Author

N75-27334*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
INSTRUMENTATION FOR MEASURING AIRCRAFT NOISE AND SONIC BOOM Patent Application
Allan J. Zukerwar, inventor (to NASA) (Old Dominion Univ.) Filed 1 Jul. 1975 17 p
(Contract NAS1-11707)
(NASA-Case-LAR-11476-1; US-Patent-Appl-SN-592159) Avail: NTIS HC $3.25 CSCL 14B

Improvements in instrumentation suitable for measuring aircraft noise and sonic booms are reported. A converter produces an electric current proportional to the sound pressure level at a condenser microphone. The electric current is transmitted over a cable and amplified by a zero drive amplifier. The converter consists of a local oscillator, a dual gate field effect transistor (FET) mixer and a voltage regulator/impedance translator. The local oscillator generates a carrier voltage that is applied to one of the gates of the FET mixer. The FET mixer mixes the microphone signal with the carrier to produce an electrical current at the frequency of vibration of the microphone diaphragm. The voltage regulator/impedance translator regulates the voltage of the local oscillator and mixer stages, eliminates the carrier at the output, and provides a low output impedance at the cable terminals. The improvements include automatic tuning compensation against changes in static microphone capacitance and means for providing a remote electrical calibration capability. NASA

N75-27335*# Case Western Reserve Univ., Cleveland, Ohio.
MICROELECTRONIC BIOINSTRUMENTATION SYSTEMS Annual Report, Jul. 1974 - Jun. 1975
Wen H. Ko and Jaroslav Hynecek 18 Jul. 1975 69 p refs
(Grant NGR-36-027-053)
(NASA-CR-143088) Avail: NTIS HC $4.25 CSCL 06B

The possibility of using RF fields to power biologically implanted transmitters used in biomedical experiments was investigated. This approach would be especially useful when animal subjects are strapped in chairs or confined in cages. A telemetry system using an external source of energy has the additional advantage of not being limited in operation by battery lifetime and can therefore operate for virtually infinite lengths of time. A description of a system based on this principle is given. Progress in the development of battery-driven transmitters is also reported, including an ingestible temperature telemetry system and a resistance-to-pulse frequency convertor for implantable temperature telemetry systems. Author

N75-27336*# Kanner (Leo) Associates, Redwood City, Calif.
MARS-3: PHOTOELECTRIC PHOTOMETRY WITH NARROW-BAND FILTERS IN THE 3700-7000 A RANGE
L. V. Ksanfomaliti and V. I. Moroz Washington NASA Jun. 1975 30 p refs Transl. into ENGLISH from the Russian report Pr-200
(Contract NASw-2481)
(NASA-TT-F-16297; Pr-200) Avail: NTIS HC $3.75 CSCL 14E

Photometric profiles of Mars over six measurement paths of the Mars-3 station (from December 15, 1971 to February 28, 1972) are given. The profiles were simultaneously recorded in five narrow spectral bands (6930, 5620, 4940, 4160 and 3700 A) using a simple photoelectric photometer. The field of view is 0.03 rad. Measuremental results are approximated by Minnaert's empirical law. The average value of k for the red filter is 0.80. k systematically decreases as the wavelength decreases; however, different k lambda dependences were obtained on different dates and in different regions. Author

N75-27337*# Science Applications, Inc., Huntsville, Ala.
DATA ANALYSIS FOR SKYLAB PROTON SPECTROMETER Bimonthly Progress Report, Apr. - May 1975
C. W. Hill 18 Jun. 1975 16 p
(Contract NAS8-31372)
(NASA-CR-143886; SAI-76-543-HU) Avail: NTIS HC $3.25 CSCL 14B

The measured values are compared to values derived from a proton environment model. Spectral data are compared, the omni-directional fluxes are found, a range of assumed pitch angle distributions are established, and the values which would be seen by an idealized proton spectrometer immersed in the model environment are computed. The measured values and calculated values are summed over time, then ratiod to provide spectral correction factors. The data are tabulated according to location, pitch angle, energy, assumed pitch angle distribution, and orientation in the earth-fixed coordinate system. With the aid of this data, detailed corrections to the proton model environment are derived. Best-fit, energy-dependent pitch angle distributions are also obtained. Some information is derived concerning the east-west asymmetry. Author

N75-27338# Technische Universitaet, Munich (West Germany).
RESEARCH ON THE INITIAL STAGE OF PHOTOGRAPHIC DEVELOPMENT WITH THE HELP OF MEASUREMENT OF THE SMALLEST EXTINCTION CHANGES IN THE NEAR INFRARED REGION Ph.D. Thesis [UNTERSUCHUNGEN ZUM ANFANGSSTADIUM DER PHOTOGRAPHISCHEN ENTWICKLUNG MIT HILFE VON MESSUNGEN KLEINSTER EXTINKTIONSAENDERUNGEN IM NAHEN INFRAROTBEREICH]
Carl Heinz Gregor 21 Oct. 1974 126 p refs In GERMAN
Avail: NTIS HC $5.75

Electron microscopic studies on developing, homogenously dispersed cubic silver bromide emulsions are used to analyze distribution and morphology of latent photographs, resp., the development nucleus. Accelerating or inhibiting affects of additives to emulsion layer or developer are detailed.
Transl. by G.G.

N75-27339# Eidgenossische Technische Hochschule, Zurich (Switzerland).
SOURCE CODING FOR COLOR PICTURES Ph.D. Thesis [QUELLENCODIERUNG FUER FARBRILDER]
Werner Frei 1974 111 p refs In GERMAN
(Rept-4983) Avail: NTIS HC $5.25

Information metrication of color pictures requires redundancy- and irrelevance-reduction for source encoding by vector- and matrix-methods. Statistical analysis develops the redundancy factors obtainable by different redundancy reducing and source encoding methods.
Transl. by G.G.

N75-27340*# Princeton Univ. Observatory, N.J.
DEVELOPMENT OF A SPECTROSCOPIC PHOTOELECTRIC IMAGING FABRY-PEROT INTERFEROMETER PRELIMINARY OBSERVATIONAL RESULTS
Wm. Hayden Smith (Kitt Peak Natl. Obs.) and Jack Gelfand (Kitt Peak Natl. Obs.) [1975] 28 p refs Sponsored by NSF
(Grant NGL-31-001-242)
(NASA-CR-143096) Avail: NTIS CSCL 20F

In order to observe extended astronomical objects at high spatial and spectral resolution, a spectroscopic photoelectric imaging Fabry-Perot interferometer was constructed. Among the properties chosen for the instrument are an air-spaced, piezoelectrically scanned design allowing an accurately settable free spectral range and employing a single etalon of high finesse. Careful design of the etalon mountings and optical train preserves high ligh throughput. Spectra of single spatial elements with a photomultiplier were obtained, and an SEC vidicon detector was used to record a series of images through the interferometer while scanning the wavelength in discrete steps. The latter procedure yields sufficient information to reconstruct spectral features over the entire object, and for the conditions assumed, either series of observations requires only a small fraction of a rotational period for Jupiter or Saturn. An electronic control system was also constructed which permits rapid and flexible variation of the operational mode of the Fabry-Perot and its ancilliary devices so as to minimize loss of observational time. Author

N75-27341# Eidgenossische Technische Hochschule, Zurich (Switzerland).
DEPTH DEPENDANCE OF THE GRANULARITY POWER SPECTRUM OF PHOTOGRAPHIC LAYERS Ph.D. Thesis
Hans-Peter Wollenmann 1974 81 p refs In GERMAN; ENGLISH summary
(Rept-4999) Avail: NTIS HC $4.75

The influence of the depth dimension of a photographic emulsion coating on the measurement of the granularity power spectrum is examined both theoretically and experimentally. For this, the emulsion is divided into elementary layers. The power spectrum of the global layer is built up as the sum of these elementary power spectra, each weighted with a different factor, which depends on the distance of the elementary layer from the plane of focus of the optical measuring system. This factor is the square of the out-of-focus modulation transfer function of the optics. A method is discussed for measuring the granularity power spectrum in dependence of the depth of the emulsion layer by successive enzymatic reduction of the upper elementary layers. Measurements on an X-ray film, which was exposed to daylight from one side, indicate equal elementary power spectra of the lower layers and an increased and flatter spectrum near the surface of the emulsion coating, due to the contribution of relatively more fine grains to the higher density of the upper layers.
Author

N75-27342# Joint Publications Research Service, Arlington, Va.
TOWED HYDROLOGICAL MEASURING SYSTEM
V. A. Gayskiy, A. V. Khokhlov, and V. F. Sytnikov 10 Jul. 1975 11 p refs Transl. into ENGLISH from Tr., Morsk. Gidrofiz. Inst., Akad. Nauk Ukr. SSR (Kiev), no. 3/59, 1972 p 84-95
(JPRS-65197) Avail: NTIS HC $3.25

A description is given of a towed system designed to measure the parameters of hydrological fields while the ship is underway.
Author

N75-27343*# Lockheed Missiles and Space Co., Huntsville, Ala.
DEVELOPMENT OF A FLOW VISUALIZATION APPARATUS Final Report
L. W. Spradley Jun. 1975 22 p refs
(Contract NAS8-30780)
(NASA-CR-143889; LMSC-HREC-TR-D390815) Avail: NTIS HC $3.25 CSCL 14B

The use of an optical flow visualization device for studying convection flow patterns was investigated. The investigation considered use of a shadowgraph, schlieren and other means for visualizing the flow. A laboratory model was set up to provide data on the proper optics and photography procedures to best visualize the flow. A preliminary design of a flow visualization system is provided as a result of the study. Recommendations are given for a flight test program utilizing the flow visualization apparatus.
Author

N75-27344*# Scientific Translation Service, Santa Barbara, Calif.
APPARATUS FOR AUTOMATIC GAS ANALYSIS AND MASS SPECTROMETERS
V. A. Pavlenko Washington NASA Jul. 1975 41 p refs Transl. into ENGLISH from Tr. Nauch-Tekh. Obshchestvo Priborstroitel Prom. (USSR), no. 4, 1959 p 96-124
(Contract NASw-2483)
(NASA-TT-F-16416) Avail: NTIS HC $3.75 CSCL 14B

The operation of thermodynamic gas analyzers, optical gas analyzers, photocolorimetric gas analyzers, and mass spectrometers is discussed in detail. Five types of mass analyzers are described along with their specifications.
Author

N75-27345*# Radio Corp. of America, Princeton, N.J.
READ-WRITE HOLOGRAPHIC MEMORY WITH IRON-DOPED LITHIUM NIOBATE Final Report, 18 Oct. 1972 - 31 Mar. 1975
G. A. Alphonse and W. Phillips May 1975 39 p refs
(Contract NAS8-26808)
(NASA-CR-143898; PRRL-75-CR-33) Avail: NTIS HC $3.75 CSCL 14E

The response of iron doped lithium niobate under conditions corresponding to hologram storage and retrieval is described, and the material's characteristics are discussed. The optical sensitivity can be improved by heavy chemical reduction of lightly doped crystals such that most of the iron is in the divalent state, the remaining part being trivalent. The best reduction process found to be reproducible so far is the anneal of the doped crystal in the presence of a salt such as lithium carbonate. It is shown by analysis and simulation that a page-oriented read-write holographic memory with 1,000 bits per page would have a cycle time of about 60 ms and a signal-to-noise ratio of 27 db. This cycle time, although still too long for a practical system, represents an improvement of two orders of magnitude over that of previous laboratory prototypes using different storage media.
Author

N75-27346# Aerospace Corp., El Segundo, Calif.
DESIGN PARAMETERS AFFECTING THE ACCURACY OF ISOTHERMAL THERMOCOUPLES
Philip J. Legendre 2 Jan. 1975 79 p refs
(Contract F04701-74-C-0075)
(AD-A004068; TR-0075(5450-72)-2; SAMSO-TR-74-262)
Avail: NTIS CSCL 14/2

The report presents an analytical study of the isothermal thermocouple commonly used on ballistic reentry vehicles to obtain the flight test data necessary to determine the thermodynamic performance of the heatshield. The objective of this study is to investigate the thermocouple design parameters and techniques that contribute to the instrument's accuracy. These parameters include the thermocouple wire diameter, the isothermal length, the lead wire length, the electrical insulation thickness, the type of heatshield material, the thermocouple depth, and the interference effects in multiwire plugs. GRA

N75-27347# Tokyo Univ. (Japan).
CHARACTERISTIC OF THE CONTAMINATED LANGMUIR PROBE AND COUNTERMOVES FOR ITS APPLICATION TO THE SPACE OBSERVATIONS
Koh-ichiro Oyama May 1975 109 p refs Repr. from Inst. of Space and Aeron. Sci., Univ. of Tokyo report 525, v. 40, no. 5, 1975 p 79-188
(ISAS-525-Vol-40-No-5) Avail: NTIS HC $5.25

An analysis of the sources of contamination of an ionospheric probe is presented. A theoretical study of ionosphere energetics (electron temperature) was performed, and an experimental model of the probe, which was tested in a space simulation chamber is shown. Results indicate that probe contamination leads to hysteresis, and a method for cleaning and protecting the probe (by glass sealing) is proposed. J.R.T.

N75-27348# Commissariat a l'Energie Atomique, Saclay (France). Div. de Metallurgie et d'Etude des Combustibles Nucleaires.
APPLICATIONS OF ACOUSTICAL HOLOGRAPHY
A. M. Touffait May 1974 17 p refs In FRENCH
(CEA-Conf-2635; Conf-740982-1) Avail: ERDA Depository Libraries HC $4.00

Holography in real time and scanning holography are briefly described. The operation and the recording of the hologram for the scanning holograph are reported. The apparatus for the reconstruction of the hologram is described. Examples are given of the application of acoustical holography to the examination of Al and steel blocks. NSA

N75-27349# General Dynamics/Electronics, San Diego, Calif.
MONOSTATIC MICROWAVE IMAGING OF BURIED OBJECTS, VOLUME 1 Final Report, Mar. - Oct. 1974
O. Yue, G. Tricoles, and E. L. Rope Oct. 1974 49 p refs
(Contract DAAK02-71-C-0264)
(AD-A004861; R-74-96-Vol-1) Avail: NTIS CSCL 14/2

High quality microwave images of realistic objects in damp soil were formed, and correlated to the structure of the objects using the monostatic measurement technique. Moreover, they compared very well with other images made in dry smooth soil. Effect of polarization and changes in frequency on the microwave image was investigated. A new way of displaying the scanned data was introduced to facilitate detection of buried objects. GRA

N75-27350# Army Electronics Command, Fort Monmouth, N.J.
A DESIGN STUDY FOR AN IMAGE STABILIZATION TEST AND SIMULATION STUDY Final Report
John A. DAgostino Dec. 1974 16 p
(DA Proj. 1S7-62703-A-176)
(AD-A003841; ECOM-4282) Avail: NTIS CSCL 14/5

The results of a design study of an experimental test and simulation facility for passive stabilized image intensifier cameras are presented. The technical goals of the simulation facility, the governing camera parameters, and several possible design techniques are discussed. GRA

N75-27351# National Bureau of Standards, Boulder, Colo. Inst. for Basic Standards.
THERMOCOUPLE REFERENCE TABLES BASED ON THE IPTS-68: REFERENCE TABLES IN DEGREES FAHRENHEIT FOR THERMOELEMENTS VERSUS PLATINUM (Pt-67) Final Report
Robert L. Powell and George W. Burns Mar. 1975 49 p refs
(COM-75-10344/0; NBS-MN-125-Suppl-1) Avail: NTIS HC $3.75 CSCL 14B

Reference tables for several thermoelements versus platinum (Pt-67) are given with values of the thermoelectric voltage as a function of temperature in degrees Fahrenheit. The tables supplement those given in NBS Monograph 125 and were caculated from the power series expansions presented in that monograph. They are based upon the absolute electrical units and International Practical Temperature Scale of 1968 (IPTS-68). GRA

N75-27352# Iowa Inst. of Hydraulic Research, Iowa City.
MULTIPLE-CHANNEL CONDUCTOMETER FOR MEASURING SALINITY CONCENTRATIONS IN LABORATORY FLOWS
John R. Glover Nov. 1970 24 p
(Contract FWPCA-WP-0218-01)
(PB-239628/1; IIHR-128) Avail: NTIS HC $3.25 CSCL 14B

A multiple-channel conductometer for measuring salinity concentrations in laboratory flows is described. Channel-to-channel influence and sensitivity to extraneous grounds have been reduced to acceptable levels by a unique probe excitation and detection system which keeps the fluid at ground potential. Conductivity rather than resistivity is measured to eliminate nonlinear concentration-voltage relationships, and special circuits are included to make calibration curves independent of the cable length between probe and instrument. The electronic system utilizes operational-amplifier technology jointly with discrete components to optimize signal processing and to take advantage of recent advances in the electronic industry. GRA

N75-27353# Eastern Environmental Radiation Lab., Montgomery, Ala.
AN INTEGRATING DEVICE FOR USE WITH PRESSURIZED IONIZATION CHAMBERS Final Report
S. T. Windham, J. E. Partridge, and H. L. Kelley Dec. 1973 11 p
(PB-239726/3; EPA-520/5-73-007) Avail: NTIS HC $3.25 CSCL 18D

A low-cost commercially available electronic integrator was adapted for use with the Reuter-Stokes Model RSS-111 pressurized ionization chamber. The integrator provides a readout of the total exposure accumulated during the integration period. This precludes the necessity of manually integrating the area under a lengthy strip chart curve. Use of the integrator with the RSS-111 is quite simple and requires no major modification of the ionization chamber. Field and laboratory tests of the integrator show that it produces consistent results over both short and long integration times, and at both high and low exposure rates. GRA

N75-27354# National Bureau of Standards, Boulder, Colo. Electronic Technology Div.
SEMICONDUCTOR NUCLEAR RADIATION DETECTOR STUDIES Final Report
A. H. Sher Sep. 1974 11 p refs Sponsored by ERDA
(COM-75-10411/7; NBSIR-74-626) Avail: NTIS HC $3.25 CSCL 18D

In response to a problem that arose with regard to the availability of germanium for lithium-drifted germanium detectors (Ge(Li) detectors), a comprehensive program was undertaken aimed toward the development of a method for the rapid specification of germanium quality for nuclear radiation detector use, and the determination of factors affecting germanium quality. Measurements on a large number of germanium crystals, and intercomparison of these measurements and the methods employed, led to developments in the measurement of lithium mobility and driftability, carrier trapping, and semiconductor defect and impurity determination via and improved infrared response (IRR) technique. GRA

N75-27355# Bureau of Mines, Bartlesville, Okla. Energy Research Center.
ACCURACY AND PRECISION OF SEVERAL PORTABLE GAS DETECTORS, ADDITIONAL STUDIES Report of Investigations, 1975
H. B. Carroll, Jr. and F. E. Armstrong Jan. 1975 40 p refs
(PB-240848/2; BM-RI-8010) Avail: NTIS HC $3.75 CSCL 14B

The performance of commercially available portable instrumentation was evaluated for the detection of nitrogen dioxide, sulfur dioxide, and hydrogen sulfide. Length-of-stain and

color-intensity detector tubes from several manufacturers were included in the study. The instruments were evaluated in atmospheres with 50 and 80 percent relative humidities at 75F and containing test gas concentrations of 0.1, 0.25, 0.50, 1.0, 1.5, and 2.0 times the threshold limit values. The results from the gas analyzers were correlated with the known contaminant concentration by calculating and plotting an estimated line of regression, confidence limits, and correlation coefficient for each detector system. The uncertainties in detection precision reported are for the observer-instrument system. GRA

N75-27356# British Steel Corp., Sheffield (England). Information Services.
ON THE COLLECTION EFFICIENCY OF DIRECTIONAL DUST GAUGES
A. P. Owst and M. Cross Feb. 1975 12 p refs
(PB-240589/2; GS/Tech/203/1/74/C) Avail: NTIS HC $3.25 CSCL 07D

The results of an initial theoretical study into the collection efficiency of directional dust gauges are presented. A simple mathematical model was developed which enables the basic features of the variation of the collection efficiency with particle size and wind characteristics to be identified. GRA

N75-27174* Naval Observatory, Washington, D.C.
PRECISE TIME AND TIME INTERVAL (PTTI), AN OVERVIEW
Gernot M. R. Winkler *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 1-15 (For availability see N75-27173 18-31)
CSCL 20J

N75-27175* Bureau International de l'Heure, Paris (France).
REVIEW OF TIME SCALES
B. Guinot *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 17-26 refs (For availability see N75-27173 18-31)
CSCL 20J

N75-27176* Naval Observatory, Washington, D.C.
REVIEW OF AVAILABLE SYNCHRONIZATION AND TIME DISTRIBUTION TECHNIQUES
R. G. Hall, T. N. Lieberman (Naval Electronic Systems Command, Washington, D. C.), and R. R. Stone (Naval Res. Lab., Washington, D. C.) *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 29-37 (For availability see N75-27173 18-31)
CSCL 17B

N75-27179* Aerospace Guidance and Metrology Center, Newark Air Force Station, Ohio.
TIME MEASUREMENT TECHNIQUES
J. F. Barnaba *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 83-89 (For availability see N75-27173 18-31)
CSCL 17G

N75-27180* Armament Development and Test Center, Eglin AFB, Fla.
USE OF PRECISION TIME AND TIME INTERVAL (PTTI)
J. D. Taylor *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 91-97 (For availability see N75-27173 18-31)
CSCL 09F

N75-27181* National Observatory, Rio de Janeiro (Brazil).
THE PRESENT DEVELOPMENT OF TIME SERVICE IN BRAZIL, WITH THE APPLICATION OF THE TV LINE-10 METHOD FOR COORDINATION AND SYNCHRONIZATION OF ATOMIC CLOCKS
Paulo Mourilhe Silva and Ivan Mourilhe Silva *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 99-107 refs (For availability see N75-27173 18-31)
CSCL 09F

N75-27184* Edgerton, Germeshausen and Grier, Inc., San Ramon, Calif.
THE MAGNETIC MATRIX TIME INTERVAL METER
S. K. Merrill and B. V. Rodgers *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 159-163 refs (For availability see N75-27173 18-31)
(Contract AT(29-1)-1183)
CSCL 14B

N75-27198* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RELATIVISTIC EFFECTS OF THE ROTATION OF THE EARTH ON REMOTE CLOCK SYNCHRONIZATION
Victor Reinhardt *In* Its Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 395-424 refs (For availability see N75-27173 18-31)
CSCL 20J

N75-27199* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A RELATIVISTIC ANALYSIS OF CLOCK SYNCHRONIZATION
J. B. Thomas *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 425-439 refs (For availability see N75-27173 18-31)
CSCL 20J

N75-27204* Australian Capital Territory. Div. of National Mapping.
STATISTICAL ANALYSIS OF TIME TRANSFER DATA FROM TIMATION 2
J. McK. Luck and P. Morgan *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 513-531 refs (For availability see N75-27173 18-31)
CSCL 20J

36 LASERS AND MASERS

Includes parametric amplifiers.

N75-27357 Colorado State Univ., Fort Collins.
APPLICATIONS OF LIGHT BEATING SPECTROSCOPY Ph.D. Thesis
Clinton Tucker Meneely 1974 75 p
Avail: Univ. Microfilms Order No. 75-14667

Methods are discussed for processing digital photon counting data to extract meaningful information from rapidly changing interference patterns produced by scatterers moving in a laser beam. This process is called light beating spectroscopy. The use of photon counting methods for light beating spectroscopy increases the sensitivity many orders of magnitude over conventional analog processing techniques. Two light beating experiments were carried out. The basic principles of light beating spectroscopy are reviewed and a general form is derived for the digital photon counting autocorrelation function. This general form was used to derive an exact expression of the digital autocorrelation function corresponding to light scattered from a dilute suspension of particles. This analysis permits the measurement of the diffusion constant of the scatterers. For the second experiment, the digital autocorrelation function is derived for the measurement of fluid velocities. Dissert. Abstr.

N75-27358 Wisconsin Univ., Madison.
MOLECULAR HYDROGEN LASER PUMPED BY A RELATIVISTIC ELECTRON BEAM Ph.D. Thesis
Jin Joong Kim 1974 112 p
Avail: Univ. Microfilms Order No. 75-9981

The pumping mechanism of stimulated emission of radiation from molecular hydrogen pumped by a high power electron beam was studied. A fast rising, 10 nsec pulse of 10,000 A of 700 keV electrons is guided by a pulsed magnetic field of 2 to 15 kG through the hydrogen gas of pressure from 5 to 200 torr. Intense lasing action is observed in the vacuum ultraviolet region of the molecular hydrogen spectrum, i.e., in the Lyman band and the

Werner band transitions similar to the previous molecular hydrogen laser experiments. There exist discrepancies in the pressure dependence of the laser output among the various reports, and it is explained in terms of the energy distribution of plasma electrons produced in the breakdown of the gas due to the high electric field induced by the fast-rising current pulse. Comparison is made between the transverse discharges and e-beam excitations, results favor the plasma electron hypothesis. Dissert. Abstr.

N75-27359 Rochester Univ., N.Y.
A CONTINUOUS, TUNABLE SOURCE OF COHERENT, ULTRAVIOLET RADIATION Ph.D. Thesis
Conger Wren Gabel 1975 258 p
Avail: Univ. Microfilms Order No. 75-15200

The development and operation of a continuous, tunable source of coherent, ultraviolet radiation is described. A nonlinear crystal is used to frequency double the intracavity beam of a continuous-wave, rhodamine 6G organic dye laser. The source can be tuned over the spectral range of 282 to 320 nm and produces several milliwatts of UV output power near the center of the tuning range with a bandwidth of 0.025 nm. The bandwidth can be narrowed to less than 0.0001 nm with an accompanying drop in UV output power to several hundred microwatts. Studies were also made of tunable UV sources and frequency doubling pulse dye lasers and CW argon lasers, secon harmonic generation as it pertains to frequency doubling and organic dye lasers, experimental apparatus and measurements, and methods for analyzing a multielement laser cavity. Dissert. Abstr.

N75-27360# Defence Research Establishment Valcartier (Quebec). Research and Development Branch.
EXPERIMENTAL AND THEORETICAL STUDY OF RAYS DIFFRACTED BY A SHARP OBSTACLE [ETUDE THEORIQUE ET EXPERIMENTALE DES DIFFRACTES PRODUITS PAR UN OBSTACLE TRANCHANT]
G. Otis Dec. 1974 20 p refs In FRENCH; ENGLISH summary
(DREV-R-4003/74) Avail: NTIS HC $3.25

Using a laser beam incident upon the edge of a razor blade, a single cone of diffracted rays was generated in order to study its properties. These cones of diffracted light are basic to geometrical theory of diffraction. However, the boundary-diffraction-wave theory was used to calculate the diffracted field. All the properties and geometrical laws associated with the diffracted rays were derived analytically. The experimental results were found to be in complete agreement with the theoretical predictions. Author

N75-27361# Defence Research Establishment Valcartier (Quebec). Research and Development Branch.
IMPROVED CIRCUITS FOR EXCITATION OF DOUBLE DISCHARGE LASERS [CIRCUITS AMELIORES POUR L'EXCITATION DE LASERS A DOUBLE DECHARGE]
M. Lacombe, M. Noel, M. Blanchard, and F. Rhealt Feb. 1975 9 p refs In FRENCH; ENGLISH summary
(DREV-R-2129/75) Avail: NTIS HC $3.25

Two improved circuits for electrical excitation of the gas in double-discharge TEA lasers are presented. The characteristics of and improvements made to the systems studied are outlined. Author

N75-27362*# Physical Sciences, Inc., Wakefield, Mass.
RADIANT ENERGY ABSORPTION STUDIES FOR LASER PROPULSION Final Report, 7 Jun. 1974 - 7 Jan. 1975
G. E. Caledonia, P. K. S. Wu, and A. N. Pirri Mar. 1975 71 p refs
(NASA-CR-134809; PSI-TR-20) Avail: NTIS HC $4.75 CSCL 20E

A study of the energy absorption mechanisms and fluid dynamic considerations for efficient conversion of high power laser radiation into a high velocity flow is presented. The objectives of the study are: (1) to determine the most effective absorption mechanisms for converting laser radiation into translational energy, and (2) to examine the requirements for transfer of the absorbed energy into a steady flow which is stable to disturbances in the absorption zone. A review of inverse Bremsstrahlung, molecular and particulate absorption mechanisms is considered and the steady flow and stability considerations for conversion of the laser power to a high velocity flow in a nozzle configuration is calculated. A quasi-one-dimensional flow through a nozzle was formulated under the assumptions of perfect gas. Author

N75-27363# Eidgenossische Technische Hochschule, Zurich (Switzerland).
CONCERNING A QUANTUM MECHANIC MASER MODEL Ph.D. Thesis
Martin Hasler 1973 88 p refs In GERMAN; ENGLISH summary
(DISS-5126) Avail: NTIS HC $4.75

A variant of the maser model of Lamb and Scully was studied rigorously by applying the theory of denumerable Markov chains and some number theory. If the pumping of the field by the atoms is too weak, then a thermal radiation is obtained. However, if the pumping is strong enough, then there is no steady state and the field is pumped to ever higher photon numbers. In order to eliminate this drawback, the model was enlarged to incorporate boson reservoirs coupled linearly to the field. The interaction of the reservoirs with the field is chosen to have the same peculiar time dependence as the interaction of the atoms with the field. For this model a steady state was obtained for all pumping rates which falls off faster than exponentially for high photon numbers. A recursive procedure is given to determine the steady state if it is analytic in one of the parameters. In an Appendix the relevant theorems and definitions about denumerable Markov chains are given. Author

N75-27364* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HIGH POWER LASER APPARATUS AND SYSTEM Patent
John C. Evans, Jr. and Henry W. Brandhorst, Jr., inventors (to NASA) Issued 8 Jul. 1975 7 p Filed 29 Jul. 1968
(NASA-Case-XLE-2529-2; US-Patent-3,894,289;
US-Patent-Appl-SN-848403; US-Patent-Class-330-4.3;
US-Patent-Class-331-94.5A; US-Patent-Class-240-41B) Avail: NTIS HC $3.25 CSCL 20E

A high-power, continuous-wave laser was designed for use in power transmission and energy-collecting systems, and for producing incoherent light for pumping a laser material. The laser has a high repetitive pulsing rate per unit time, resulting in a high-power density beam. The laser is composed of xenon flash tubes powered by fast-charging capacitors flashed in succession by a high-speed motor connected to an automobile-type distributor. L.B.

N75-27365# Los Alamos Scientific Lab., N.Mex.
REVIEW OF SOFT X-RAY LASERS USING CHARGE EXCHANGE
C. D. Cantrell, M. O. Scully, and K. Boyer 1974 101 p refs Presented at the Orbis Scientist Meeting, Coral Gables, Fla. 21 Jan. 1975
(Contract W-7405-eng-36)
(LA-UR-75-286; Conf-750110-2) Avail: NTIS

A review of charge exchange vacuum ultraviolet and soft X-ray lasers using ion beams is presented. The basic idea of the reaction is that one avoids the rapid Auger rates characteristic of many other X-ray laser schemes by picking up an electron in the outer shell of a hydrogen-like, helium-like, or lithium-like ion. The cross section for pickup in an excited state is larger than for pickup in the lower state for some range of ion energies, due to a near resonance between the state into which pickup occurs and the state of an appropriate target atom. One of the major results presented is a discussion of a coherent calculation of the gain to be expected in swept excitation. It is shown that simple estimates of the gain based on rate equations may seriously misrepresent the actual behavior of a system subjected to traveling wave excitation. The finite time required for the atomic population to generate a coherent dipole moment, reduces the maximum value of the gain below the rate equation value. Author (NSA)

N75-27366# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON THE POSSIBILITY OF CONSTRUCTING PULSED GAS LASERS WITH ELECTRON BEAM PUMPING IN AN ELECTRIC FIELD

Yu. V. Afanasev and E. M. Belenov 2 Nov. 1974 9 p refs Transl. into ENGLISH from Vysokomolekul. Soedin., Seriya B. Kratkie Soobshcheniya (Moscow), no. 11, Nov. 1970
(AD-A004817; FTD-HC-23-2596-74) Avail: NTIS CSCL 20/5

The paper reports the possibility of constructing pulsed gas lasers with mixed excitation, when the gas is pumped with an electron beam and an electric field simultaneously. The proposed excitation method makes it possible, in principle, to obtain high radiated laser power owing to uniform excitation of large gas volumes at high pressures. The role of the electron beam actually amounts to the creation of conditions for streamerless discharge development, and the excitation energy comes mainly from the external electric field. GRA

N75-27367# Stanford Univ., Calif. Microwave Lab.
ULTRANARROWBAND TUNABLE DYE LASER FOR NEW APPROACHES TO ATOMIC SPECTROSCOPY Technical Report, 1 Jan. - 31 Dec. 1974
Theodor W. Hansch Dec. 1974 31 p refs
(Contract N00014-67-A-0012-0071; NR Proj. 016-125)
(AD-A004629; SU-ML-2391; TR-3) Avail: NTIS CSCL 07/4

The report summarizes a successful experiment to measure the Rydberg constant with an accuracy of one part in 100 million by saturation spectroscopy of the Balmer line of atomic hydrogen and deuterium, using a repetitively pulsed tunable dye laser. The second, largest part of the report gives design features and operating characteristics of a newly developed dye laser oscillator/amplifier system, pumped by 1 MW nitrogen laser, which offers one or two orders of magnitude higher peak power per spectral interval than any other presently available dye laser, using comparable pump source. Its potential for nonlinear molecular spectroscopy is illustrated by a high resolution two-photon excitation spectrum of benzene vapor. The third part reports on the generation of the narrowband tunable ultraviolet radiation by frequency doubling of the dye laser output. GRA

N75-27368# Owens-Illinois, Inc., Toledo, Ohio. Corporate Technology Div.
DAMAGE THRESHOLD STUDIES OF GLASS LASER MATERIALS Final Report, 1 Jul. 1972 - 31 Aug. 1974
Norman L. Boling and George Dube 31 Aug. 1974 211 p refs
(Contract DAHC15-72-C-0170; ARPA Order 2050)
(AD-A004551) Avail: NTIS CSCL 20/5

In Section I, results of studies of Q-switched laser damage to transparent uncoated dielectric surfaces are presented. It is concluded that surface scratches and digs on some conventionally polished glasses are not of prime importance in damage. Rather, contaminants left by the polishing process determine the damage threshold. Removal of these contaminants can be effected by treatment in hot nitric acid or hot water, raising the threshold to as high as 500 J/sq cm (30 ns). The effectiveness of the treatment is dependent on polishing history. An analysis of pulse cutoff by the damage site is also presented. It is concluded that the shape of the cutoff is not related to the damage mechanism, but rather to the manner in which the plasma expands across the laser beam. In Section II, results of experiments on the feasibility of a high energy density Nd:glass laser are reported. Damage-free operation at more than 4.4 GW/sq cm (70 J/sq cm in a 15 ns pulse) was achieved. Restraints on higher irradiance operation and possible improvements are discussed. GRA

N75-27369# Rochester Univ., N.Y. Dept. of Physics and Astronomy.
PROPERTIES AND INTERACTIONS OF COHERENT RADIATION Final Report, 1 Oct. 1973 - 31 Dec. 1974
L. Mandel Dec. 1974 8 p
(Grant AF-AFOSR-2593-74; AF Proj. 9751)
(AD-A004459; AFOSR-75-0127TR) Avail: NTIS CSCL 20/5

The research includes work on spatial coherence properties of lasers far below threshold, spectral broadening of the electromagnetic field near focus seen by a moving atom, plane wave representations and validity of semiclassical electromagnetic theories for treating the emission and absorption of light. GRA

N75-27370# Northrop Research and Technology Center, Hawthorne, Calif.
CAF2 LASER WINDOW STUDY Final Report
S. J. Holmes, P. Kraatz, and A. Klugman Nov. 1974 34 p refs
(Contract N00014-75-C-0009)
(AD-A004300; NRTC-74-57R) Avail: NTIS CSCL 20/6

Single crystal calcium fluoride material has been polished, antireflection coated and characterized. The objective of this effort was to obtain the necessary surface preparation and antireflection coating (PbF2, ThF4, MgF2, BaF2) information for single crystal calcium fluoride substrates for use as high energy/power windows operating in the 3-5 micrometer wavelength region. GRA

N75-27371# United Aircraft Corp., East Hartford, Conn.
INVESTIGATION OF THE STABILITY OF LASER DISCHARGES Interim Report, 22 Jan. 1973 - 28 Feb. 1974
R. H. Bullis, W. L. Nighan, and W. J. Wiegand Nov. 1974 58 p refs
(Contract F33615-73-C-4107; AF Proj. 7073)
(AD-A004418; UARL-M921612-5; ARL-74-0130) Avail: NTIS CSCL 20/5

Experimental and analytical investigations have revealed that negative ion processes affect both the steady discharge characteristics and the plasma stability of high power, carbon dioxide lasers. Computations including the pertinent negative ion attachment/detachment reactions have successfully modeled the measured steady properties of these volume-dominated discharges. However, the theoretical stability analysis indicates that conditions favoring ionization instability are readily achieved. Experimental detection of systematic plasma fluctuations confirms that ionization instability induced by molecule attachment reactions leads to the formation of running striations. As anticipated theoretically, these are removed by the addition to the original gas mixture of molecules such as CO and hydrogen which detach electrons from the atomic oxygen negative ion. Additional studies indicate that very small concentrations of plasma produced impurities such as NO, nitrous oxide, and nitrogen dioxide adversely affect discharge stability through their influence on negative ion processes. GRA

N75-27372# Hughes Research Labs., Malibu, Calif.
HOLMIUM, 2 MICROMETER PUMPED OPTICAL PARAMETRIC OSCILLATOR Final Technical Report, 1 May 1972 - 3 Jun. 1974
C. K. Asawa, A. I. Braunstein, D. P. Devor, V. Evtuhov, and A. L. Gentile Oct. 1974 155 p refs
(Contract F33615-72-C-1654; AF Proj. 6100)
(AD-A004213; AFAL-TR-74-318) Avail: NTIS CSCL 20/6

The program had as its objective the demonstration of a parametric oscillator operating throughout the 4 to 5 micrometer region pumped by a 2.1 micrometer Ho:YAG (holmium-activated, erbium, and thulium sensitized YAG) laser. Proustite was chosen as the most practically suitable nonlinear material for this work. The value of laser pump induced damage threshold allowed pumping somewhat over the calculated oscillator threshold. In the course of the program several difficulties were encountered. They involve the crystal quality, the fabrication of broad band low loss multilayer dielectric coatings, uncertainties in the alignment of resonator and crystal, pump laser damage to proustite and the possibility of self-damage by internal resonant oscillator fields. GRA

N75-27373# Naval Electronics Lab. Center, San Diego, Calif.
PULSED EXCITATION OF RADIATION FROM ZINC VAPOR: DOMINANCE OF EMISSION IN THE BLUE-GREEN INDICATES POTENTIAL HAS AS INEXPENSIVE SOURCE FOR UNDERWATER SYSTEMS Research and Development Report, Feb. 1973 - Jul. 1974
M. Geller, D. E. Altman, and G. D. Barstow 1 Nov. 1974 44 p refs
(AD-A004607; NELC/TR-1937) Avail: NTIS CSCL 20/5

Time-resolved spectra from electrically pulsed zinc vapor discharges show a dominance of peak power emission in the blue-green. There is a good potential of developing a convenient, inexpensive source for underwater systems, as kilowatts of peak power were obtained in this spectral region from a short arc configuration. The dominant transitions were at a triplet (4680, 4722, and 4810 A) in ZnI and at a doublet (4912 and 4924 A)

in ZnII. Gain measurements show that in a pulsed electric discharge of pure zinc the population of the ground state of the doublet was unexpectedly large. Oscillations at these wavelengths by electron collisional excitation do not occur. This was verified experimentally. Models are proposed for anomalous population densities of excited states and for the above dominance of fluorescent spectra. GRA

N75-27374# National Bureau of Standards, Boulder, Colo. Electromagnetics Div.
A PYROELECTRIC POWER METER FOR THE MEASUREMENT OF LOW LEVEL LASER RADIATION Final Report
C. A. Hamilton and G. W. Day Feb. 1975 42 p refs
(COM-75-10343/2; NBS-TN-665) Avail: NTIS; SOD HC as C13.46:665 CSCL 20E

As a part of research program to develop high detectivity, large area pyroelectric detectors required by certain problems in laser metrology, the authors designed, constructed and evaluated a transfer standard type of laser power meter. This instrument is fast, precise and operates at low power levels. The design details and evaluation results on three of these instruments are presented. The detector used in these instruments is based on the pyro-electric effect in polyvinylidene fluoride. The devices have an active area of 1 sq cm. They are inherently uniform over their surface and have a large dynamic range. Because they are thermal detectors, their spectral response is determined entirely by the absorptivity of their surfaces (typically gold black). For their size, these plastic pyroelectric detectors have a noise equivalent power which is unmatched by any other thermal detector (1-2 n(Hz to the 1/2 power) at low frequencies). GRA

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N75-27375+ Engineering Sciences Data Unit, London (England).
INTRODUCTION AND GUIDE TO USE, CURRENT CONSTITUTION OF TECHNICAL COMMITTEES, INDEX 1975
1975 362 p
Copyright. Avail: NTIS HC $10.00

A wide range of authoritative data for application in engineering issued in the form of data sheets and memoranda is presented. Over 650 data items are available for application to a wide range of engineering design projects and the index insures the location of any information pertinent to engineering. Author

N75-27376* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
APPARATUS FOR WELDING SHEET MATERIAL Patent
William Dubusker (McDonnell Aircraft Co., St. Louis), Frank S. Pogorzelski (McDonnell Aircraft Co., St. Louis), and Clem W. Fridrich, inventors (to NASA) (McDonnell Aircraft Co., St. Louis) Issued 27 Sep. 1966 7 p Filed 6 Nov. 1963 Continuation-in-part of US Patent Appl. SN-153624, filed 20 Nov. 1961 Sponsored by NASA
(NASA-Case-XMS-01330; US-Patent-3,275,794; US-Patent-Appl-SN-322565; US-Patent-Class-219-125; US-Patent-Appl-SN-153624) Avail: US Patent Office CSCL 13I

Welding apparatus for fusion butt welding adjacent edges of objects such as thin metal sheets is described. The members are supported during welding and are welded without filler material. Smooth and uniform thickness weld connections which are able to withstand pressures of the same order of magnitude as the unwelded members without rupturing, leaking, or otherwise deteriorating are produced. The weld connections are suitable for use with metals which are ordinarily very difficult to weld. The butt weld seams are less apt to be weakened by pitting and corrosion. Official Gazette of the U.S. Patent Office

N75-27377 Welding Inst., Cambridge (England).
WELDING LOW TEMPERATURE CONTAINMENT PLANT. VOLUME 1: THE PAPERS
1973 280 p refs Conf. held at London, 20-22 Nov. 1973
Copyright. Avail: Issuing Activity

Some large-scale applications of cryogenics in metal welding are presented. The design and construction of plants for separating air and gas mixtures and the use of liquefied natural gas and liquid hydrogen are discussed. The following topics are also included: welding consumables for nickel steels; fracture toughness properties derivation and application; studies of various cryogenic materials; and, codes of practice for storage tanks. L.B.

N75-27378 Welding Inst., Cambridge (England).
WELDING LOW TEMPERATURE CONTAINMENT PLANT. VOLUME 2: DISCUSSIONS
1975 160 p Conf. held at London, 20-22 Nov. 1973
Copyright. Avail: Issuing Activity
For abstract, see N75-27377.

N75-27379 British Library Lending Div., Boston Spa (England).
FOIL BEARING: EXPERIMENTAL DISCUSSION FOIL SHAPE
Y. Mori, K. Hayashi, and T. Yokomi Dec. 1974 19 p refs Transl. into ENGLISH from Nippon Kikai Gakkai Rombunshu (Japan) v. 37, no. 295, 1971 p 602-610
(BLL-RTS-8836) Avail: British Library Lending Div., Boston Spa, Engl.: £3.60; 6 BLL photocopy coupons

Experiments were conducted on the shape of the foil (bearing clearance distribution in the self-acting foil) using air as a functioning fluid. The theory and data obtained differ from previous research in the large position change of foil bearing clearance. An analysis of the separating boundary conditions and comparisons with theoretical values are also included. Factors affecting foil shapes, foil tension, slipping velocity, and wrap-angles were varied. The changing position of foil was measured by the capacitance method with foil shape observed on the oscillograph of the Braun tube. It is verified that the two-dimensional fluid-slipping theory under separating boundary conditions was sufficiently effective for self-acting foil bearing using a compressive fluid, such as air, as the functioning fluid. Author

N75-27380# Joint Publications Research Service, Arlington, Va.
VIBROACOUSTIC DIAGNOSTICS AND THE REDUCTION OF THE VIBRATION OF SHIPBOARD MACHINERY
V. I. Popkov 6 Jun. 1974 236 p refs Transl. into ENGLISH of the book "Vibroakusticheskaya Diagnostika i Snizheniye Vibroaktivnosti Sudovykh Mekhanizmov" Leningrad, Izdatelstvo Sudostroyeniye, 1974 p 3-221
(JPRS-64931) Avail: NTIS HC $7.50

A generalized mathematical description is presented of the forced vibrations of shipboard machinery in the sound frequency range, and the processes of propagation of vibrational energy in the system made up of the machinery, the antivibrational mounting, and the foundation. Methods of discovering the causes of vibrations and controlling them on the path of their propagation inside the machinery are discussed. For individual titles, see N75-27381 through N75-27385.

N75-27381 Joint Publications Research Service, Arlington, Va.
VIBRATION LEVELS AND THE DYNAMIC INTERACTION OF SHIPBOARD MACHINERY WITH SUPPORTING AND NONSUPPORTING LINKS
V. I. Popkov *In its* Vibroacoustic Diagn. and the Reduction of the Vibration of Shipboard Machinery (JPRS-64931) 6 Jun. 1975 p 3-55 Transl. into ENGLISH from the book "Vibroakusticheskaya Diagnostika i Snizheniye Vibroaktivnosti Sudovykh Mekhanizmov" Leningrad, Izdatelstvo Sudostroyeniye, 1974 (For availability see N75-27380 18-37)

Equations are presented which characterize the dynamics of machinery in the entire sound frequency range. The vibrational processes are described in terms of the machine, the shock absorbers, and the foundation as linear discrete mechanical systems with a finite number of point contacts. The magnitude of the contact point between the elements depends on the frequency range. The general equations of the forced vibrations of the system made up of the machinery, the shock absorbers, and the foundation for the entire sound frequency range are obtained when using the point and transitional mechanical resistances and compliance of the structural elements as the

proportionality coefficients between the vibrational forces and rates. Author

N75-27382 Joint Publications Research Service, Arlington, Va.
VIBRATIONAL ENERGY FLUX TO THE SUPPORTING AND NONSUPPORTING LINKS DURING OPERATION OF SHIPBOARD MACHINERY
V. I. Popkov *In its* Vibroacoustic Diagn. and the Reduction of the Vibration of Shipboard Machinery (JPRS-64931) 6 Jun. 1975 p 56-85 Transl. into ENGLISH from the book "Vibroakusticheskaya Diagnostika i Snizheniye Vibroaktivnosti Sudovykh Mekhanizmov" Leningrad, Izdatelstvo Sudostroyeniye, 1974 (For availability see N75-27380 18-37)

The vibrational activity of machinery is characterized by the emission of vibrational energy to the connected structural elements during operation. The following factors are considered in terms of the vibrational energy flux: the machinery as sources of vibration; the multipoint nature of its links; the multidirectional nature of the vibrations; the magnitude of the force effect; and the mechanical resistances of the structural elements. J.M.S.

N75-27383 Joint Publications Research Service, Arlington, Va.
METHODS AND MEANS OF INVESTIGATING THE VIBRATIONS OF SHIPBOARD MACHINES
V. I. Popkov *In its* Vibroacoustic Diagn. and the Reduction of the Vibration of Shipboard Machinery (JPRS-64931) 6 Jun. 1975 p 86-113 Transl. into ENGLISH from the book "Vibroakusticheskaya Diagnostika i Snizheniye Vibroaktivnosti Sudovykh Mekhanizmov" Leningrad, Izdatelstvo Sudostroyeniye, 1974 (For availability see N75-27380 18-37)

The application of computer techniques and specialized digital devices to process data from vibration transducers and determine the sources of vibrations is considered. A data transmission channel which preprocesses the signals and converts them into digital code for final processing in a digital computer is described. Bearing vibrations of kinematic origin are characterized and analyzed. J.M.S.

N75-27384 Joint Publications Research Service, Arlington, Va.
VIBRATIONAL DIAGNOSTICS OF MACHINERY BY THE DATA ON MECHANICAL RESISTANCES, DYNAMIC FORCES AND EMITTED VIBRATIONAL ENERGY
V. I. Popkov *In its* Vibroacoustic Diagn. and the Reduction of the Vibration of Shipboard Machinery (JPRS-64931) 6 Jun. 1975 p 114-145 Transl. into ENGLISH from the book "Vibroakusticheskaya Diagnostika i Snizheniye Vibroaktivnosti Sudovykh Mekhanizmov" Leningrad, Izdatelstvo Sudostroyeniye, 1974 (For availability see N75-27380 18-37)

Various methods and devices which aid in the determination of the sources of vibrations in machinery are described. The following are included: measurement of mechanical resistances and resonance characteristics of machines; determination of natural frequencies and dynamic forces; and investigation of vibrational activity of machines in terms of the vibrational energy flux. J.M.S.

N75-27385 Joint Publications Research Service, Arlington, Va.
DECREASING THE VIBRATIONS IN THE STRUCTURAL ELEMENTS OF SHIPBOARD MACHINERY
V. I. Popkov *In its* Vibroacoustic Diagn. and the Reduction of the Vibration of Shipboard Machinery (JPRS-64931) 6 Jun. 1975 p 146-223 Transl. into ENGLISH from the book "Vibroakusticheskaya Diagnostika i Snizheniye Vibroaktivnosti Sudovykh Mekhanizmov" Leningrad, Izdatelstvo Sudostroyeniye, 1974 (For availability see N75-27380 18-37)

The inertial-rigidity characteristics of machine structural elements which determine the degree of transmission of dynamic forces and vibrations from the working assemblies to the supporting and nonsupporting links are considered of the structural elements of the housings of shipboard machines and the modular units. Various methods of reducing vibrations in the structural elements are discussed. Author

N75-27386*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MAGNETIC BEARING SYSTEM Patent Application
Philip A. Studer, inventor (to NASA) Filed 3 Jul. 1975 29 p (NASA-Case-GSC-11978-1; US-Patent-Appl-SN-593142) Avail: NTIS HC $3.75 CSCL 13I

A magnetic bearing system is described which includes a high magnetic permeability interior disc member that is symmetrical about a longitudinal z axis. An annular member of high magnetic permeability is coaxial with and surrounds the disc, but is mechanically free of it, being supported by magnetic flux originating in the disc and traversing an annular air gap between the members. Pole faces of the members are arranged so that maximum permeance in the air gap between them is in radial flux paths at right angles to the z axis and the annulus is supported in the z axis direction at the same position as the disc and at its angles to the z axis (in an x-y plane). The radial position of the annular member relative to the disc is controlled with electromagnet circuits that supply fluxes to diametrically opposed portions of the air gap between the disc and floating annulus. NASA

N75-27387# Katholieke Universiteit te Leuven (Belgium).
PHYSICO-MATHEMATICAL ANALYSIS OF THE ELECTRO DISCHARGE MACHINING PROCESS
Frans VanDijck [1974] 123 p refs
Avail: NTIS HC $5.25 CSCL 13H

Calculation methods were developed for simulating the different phenomena occuring in EDM sparks and for determining the volume of metal melted per pulse and the volume of metal removed per pulse. This is to predict on a theoretical base the dependent parameters for different working conditions. Previously reported experimental results for the potential gradient in arcs were used to determine the power dissipated in the plasma column. The temperature and field electron emission theory and Mackeown's equation were applied for calculating the power distribution between anode and cathode. Single and multiple discharge experiments were conducted to test the validity of the calculation methods. Comparisons between experiments and calculations show that the molten volume of metal and the material removed per pulse can be determined by the developed computer programs. Author

N75-27388*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CENTAUR LIQUID OXYGEN BOOST PUMP VIBRATION TEST
Hsin Ming Tang Jul. 1975 94 p refs
(NASA-TM-X-71774; E-8427) Avail: NTIS HC $4.75 CSCL 13K

The Centaur LOX boost pump was subjected to both the simulated Titan Centaur proof flight and confidence demonstration vibration test levels. For each test level, both sinusoidal and random vibration tests were conducted along each of the three orthogonal axes of the pump and turbine assembly. In addition to these tests, low frequency longitudinal vibration tests for both levels were conducted. All tests were successfully completed without damage to the boost pump. Author

N75-27389# Eidgenossische Technische Hochschule, Zurich (Switzerland).
RESEARCH OF MIXTURE FORMATION AND COMBUSTION IN DIESEL ENGINES THROUGH APPLICATION OF MODEL THEORY Ph.D. Thesis [UNTERSUCHUNG DER GEMISCHBILDUNG UND VERBRENNUNG IM DIESELMOTOR UNTER ANWENDUNG DER MODELLTHEORIE]
George Lustgarten 1973 161 p refs In GERMAN; ENGLISH summary
(Rept-5116) Avail: NTIS HC $6.25

An accurate model of the mixing process in combustion was achieved by limiting the similarity considerations to dominant phenomena. To test the similarity theory, a fuel spray was simulated by injecting a jet of liquid into another liquid; the tests shown that the model process and the fuel spray matched well. Apart from the geometric similarity, the Strouhal number was found to be the only dominant similarity law for spray penetration. The theory was also applied to the combustion process in a turbocharged diesel engine with direct injection, and shows the dominant influence of the macromixing phenomena for the whole combustion process. Author

N75-27390# VDI-Verlag G.m.b.H., Duesseldorf (West Germany).
EXTRUDING OF SECTION SHAPES AND TUBES [EXTRU-

DIEREN VON PROFILEN UND ROHREN]
1974 178 p refs In GERMAN
Avail: NTIS HC $7.00

The following topics are discussed: (1) tools and sequential aggregates for extruding sequential shapes; (2) design, layout and tuning of shaping tools; (3) production of full scale shapes from thermoplastics materials; (4) production of hollow and full section shapes from thermoplastic structural foam materials; and (5) measurement and control of wall thickness in extracted pipes. Transl. by G.G.

N75-27391# Technische Universitaet, Munich (West Germany).
THEORETICAL AND EXPERIMENTAL STUDIES ON THE TWO-WAY EFFECTS OF PROCESS VARIABLES IN THE OFFSET PROCESS AND THEIR AFFECTS ON PRINT QUALITY IN PROCESS OPTIMIZATION Ph.D. Thesis [THEORETISCHE UND EXPERIMENTELLE UNTERSUCHUNGEN UEBER DIE GEGENSEITIGE BEEINFLUSSUNG DER PROZESSVARIABLEN DES OFFSETVERFAHRENS UND DEREN AUSWIRKUNG AUF DIE DRUCKQUALITAET ALS ZIELGROESSE DES PROZESSES]
Peter Decker 27 Jun. 1974 203 p refs In GERMAN
Avail: NTIS HC $7.25

Technical and physical aspects of the offset printing process are studied for their interaction parameters in process optimization. Emphasis is placed on the rheological properties of ink emulsions, effects of press dampening, color intensity of prints and tone rendering, as well as temperature effects on ink layer thickness, ink viscosity and wetting agent volume. Transl. by G.G.

N75-27392# Technische Universitaet, Munich (West Germany).
CALCULATION OF WORM GEAR DRIVE WITH VARIABLE TOOTH PROFILES. BEARING STRENGTH AND POWER LOSS FOR HOLLOW CIRCULAR-, INVOLUTE-, AND LINEAR-PROFILES Ph.D. Thesis [BERECHNUNG VON SCHNECKENGETRIEBEN MIT UNTERSCHIEDLICHEN ZAHNPROFILFORMEN. TRAGFAEHIGKEIT UND VERLUSTLEISTUNG FUER HOHLKREIS-,EVOLVENTEN-UND GERADLINIENPROFIL]
Helmut Wilkesmann 1 Aug. 1974 119 p refs In GERMAN
Avail: NTIS HC $5.25

An ALGOL computer program is developed for calculating various axial geometry profiles of worm gears, the distribution of their bearing capacity, power loss, and Hertz pressure over the entire action field in order to determine the limits of high and low load capacities. Transl. by G.G.

N75-27393*# Perkin-Elmer Corp., Norwalk, Conn.
SYSTEM TEST REPORT: LST SECONDARY MIRROR ARTICULATION MECHANISM P/N 660-0417
W. E. Kohman 10 May 1975 38 p
(Contract NAS8-29723)
(NASA-CR-143888; Rept-12507) HC $3.75 CSCL 20K

Modifications to the LST 660-0471 secondary mirror system are given. The system was tested and position sensors recalibrated. Also, the actuator voltage to position gain and frequency response and threshold were determined for each axis. Data sheets, calculations, and plotted data are included. E.H.W.

N75-27394*# Southwest Research Inst., San Antonio, Tex.
PERMANENT AND SEPARABLE AEROSPACE TUBING/FITTING EVALUATION PROGRAM, VOLUME 1 Final Report
C. R. Ursell and C. R. Franz May 1975 103 p refs
(Contracts NAS9-14265; F33657-71-C-0914; SwRI Proj. 03-3113; SwRI Proj. 03-3996)
(NASA-CR-141899) Avail: NTIS HC $5.25 CSCL 13E

The tube fitting evaluation program was conducted to develop a standard overall test program including methods, procedures, and equipment as well as recommended test sequences for qualifying fitting/tubing assemblies. The program consisted of testing the MS flareless (separable) fitting and utilizing the results as baseline data from which all other fittings will be evaluated. Five separable designs and five permanent designs were tested in three sizes with two types of tubing materials. The basic design requirements were 4,000 psi operating pressure within the temperature range of minus 65 F to plus 450 F while also being compatible with 21-6-9 and titanium 3Al-2.5V tubing alloys. M.J.S.

N75-27395# Technische Universitaet, Brunswick (West Germany).
TEMPERATURE AND FLOW TECHNOLOGY RESEARCH OF A ROBERT EVAPORATOR OF INDUSTRIAL SIZE Ph.D. Thesis [WAERME-UND STROEMUNGSTECHNISCHE UNTERSUCHUNGEN AN EINEM ROBERT-VERDAMPFER VON INDUSTRIELLER GROESSE]
Heinz-Josef Schmitz 25 Oct. 1973 129 p refs In GERMAN
Avail: NTIS HC $5.75

Results of flow- and heat-transfer measurements on a multiple pipe flow evaporator with central flow return pipe are reported. Tests with water and aqueous NaCl- or CaCl2-solutions are compared to results from a smaller circulation evaporator for calculated heat transfer coefficients. It is concluded that test data from the smaller circulation system are transferable to similar evaporators of technical dimensions. Transl. by G.G.

N75-27396# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
INFLUENCE OF HIGH HYDROSTATIC PRESSURE EXTRUSION ON MECHANICAL BEHAVIOR OF MATERIALS Semiannual Report, 1 Jun. - 31 Dec. 1974
Oleg D. Sherby, John C. Shyne, and Erastus H. Lee Dec. 1974 21 p refs
(Contract N00014-67-A-0112-0083; ARPA Order 2783)
(AD-A004221; SAR-1) Avail: NTIS CSCL 13/9

Hydrostatic extrusion is a promising new metal working process. It may provide a practical technique to form useful wrought products from materials difficult or impossible to work by other processes, and it offers the means to develope superior useful properties. This program of research is concerned with the response of a variety of materials to hydrostatic extrusion. A major objective is to relate the microstructure and mechanical properties of extruded materials to the important processing variables, extrusion ratio, extrusion pressure, temperature, and extrusion rate. GRA

N75-27397# RAND Corp., Santa Monica, Calif.
COMPUTER BASED AUTOMATION OF DISCRETE PRODUCT MANUFACTURE: A PRELIMINARY DISCUSSION OF FEASIBILITY AND IMPACT
Alexander F. Brewer, T. O. Ellis, G. F. Groner, D. E. Roseen, and W. L. Sibley Jul. 1974 61 p refs Sponsored in part by ARPA
(Contract DAHC15-73-C-0181)
(AD-A004612; R-1073-ARPA) Avail: NTIS CSCL 13/8

The preliminary findings are presented of an investigation of potential technological feasibility and effect of advanced automation and robotics, including several innovative concepts for flexible, programmable automation of manufactured hard goods. Programmable automation for such processes as parts forming and machining, assembly, inspection, transfer and storage of materials, tooling, scheduling, and inventory control would provide: (1) computer control, free of human drudgery and independent of human reaction speeds and individual variations, (2) flexibility within broad product classes, such as small electromechanical systems, and (3) integration with other computerized systems. GRA

N75-27398# Naval Ship Research and Development Center, Bethesda, Md. Ship Performance Dept.
RECOMMENDED VEHICLE CONCEPTS FOR WATERJET PROPELLED HIGH-PERFORMANCE VEHICLES Final Report
L. T. Ravenscroft, Jr. and P. B. Mathis Dec. 1974 56 p refs (SF43421012)
(AD-A004621; SPD-572-01) Avail: NTIS CSCL 13/10

A rapid method is developed for providing first order estimates of the smooth water powering and weight characteristics of SES, hydrofoil, and planing craft concepts employing waterjet propulsors. A computer program utilizing this method and applicable to SES concepts is included. GRA

N75-27399# Midwest Research Inst., Kansas City, Mo.
DETERMINATION OF CHANGES IN LUBRICANT VISCOS-

ITIES AT HIGH PRESSURES AND TEMPERATURES Final Report, 15 Jan. 1973 - 15 Apr. 1974
Alfred J. Bossert and Vern Hopkins Oct. 1974 58 p refs
(Contract F33615-73-C-5069; AF Proj. 7343)
(AD-A004200; AFML-TR-74-195) Avail: NTIS CSCL 11/8

Absolute viscosity, kinematic viscosity, density and secant bulk modulus values determined for seven lubricating fluids are presented. The determinations were made with a falling weight viscometer at temperatures of 100, 210, and 300F and at pressures ranging from atmospheric to 160,000 psi. Plots of absolute viscosity and density are given and all results are discussed. The equipment used to make the determinations is described and the procedures followed to collect data and reduce to fluid property values are outlined. GRA

N75-27400# General Electric Co., Cincinnati, Ohio.
FUELS AND LUBRICANTS INFLUENCE ON TURBINE ENGINE DESIGN AND PERFORMANCE Final Technical Report, Apr. 1971 - Apr. 1973
Ivan E. Sumey Aug. 1974 223 p refs
(Contract F33615-71-C-1512; AF Proj. 3048)
(AD-A004214; AFAPL-TR-73-54-Vol-2) Avail: NTIS CSCL 11/8

This study evaluates the influence of fuel temperature limits and engine lubricant temperature limits on installed interceptor performance at the airframe subsystem and engine component level. Engine cycles, representative of technology levels necessary to provide high Mach, steady-state cruise capability in the 1980 time period, were selected. Definition of these concepts permitted evaluation of engine performance as a function of fuel and lubricant properties and temperature limitations. Installed performance increments then were determined for advanced interceptors using takeoff gross weight in a fixed mission role as the primary figure of merit. This allowed a measure of the relative performance significance of airframe subsystem and engine component design changes. The relative allotment of available fuel heat sink between engine and airframe was also investigated to determine the primary factors affected by fuel interface temperature which may influence aircraft performance, and to provide meaningful design guidance for future systems application. GRA

N75-27401# Southwest Research Inst., San Antonio, Tex.
REFERENCE OIL C STATUS REPORT, 1973 AND 1974 Technical Report, 1 Jan. 1973 - 31 Aug. 1974
Burl B. Baber Dec. 1974 61 p refs
(Contract F33615-72-C-1097; AF Proj. 3048)
(AD-A003437; SwRI-RS-617; AFAPL-TR-74-95) Avail: NTIS CSCL 11/8

A summary of the gear load-carrying capacity of Reference Oil C, determined by from three to eight cooperating laboratories using Ryder gear machines, WADD gear machines, and AFB gear machines, is presented. Based upon 1,392 determinations obtained during an 8-yr period using the three different machine types, the overall mean load-carrying capacity for Reference Oil C is shown to be 2,948 lb/inch. A possible difference, at the 95-percent confidence level, in the load-carrying capacity obtained using test gears with different gear letter prefixes is indicated. This possible difference in test gears, however, is overshadowed by the wide spread, up to 564 lb/in., in the mean load-carrying capacities obtained by the different laboratories. Inspection data for Reference Oil C, recorded semiannually for a period of over 8 yrs, do not indicate any appreciable change in viscosity, neutralization number, API gravity, saponification number, water content, trace sediment, or contamination. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N75-27402 British Library Lending Div., Boston Spa (England).
THE USE OF MICROWAVES FOR CHECKING THE INTERNAL GEOMETRY OF SLENDER STEEL TUBES
H. Mintrop and P. Roth 11 Nov. 1974 8 p refs Transl. into ENGLISH from Messen und Druefen/Automatic (Hanover), Oct. 1973 p 635-637
(BLL-CE-Trans-6549-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

Nondestructive tests of steel tubes used in nuclear power stations are discussed. Safety requirements, manufacturing processes, and quality were considered. Measurement results using a cavity resonator constructed from a piece of the tube are given. E.H.W.

N75-27403 Texas A&M Univ., College Station.
CONTROL LIMITS FOR DEPENDENT OBSERVATIONS Ph.D. Thesis
Jocelyn Anthea Tommerup 1974 133 p
Avail: Univ. Microfilms Order No. 75-15075

To partially meet the need for control techniques for dependent observations, several models assuming some degree of dependency were proposed and illustrated with practical applications. The models chosen represent observations generated by moving averages, the linear autoregressive mechanism, a two-state Markov chain, and the number of renewals for selected ordinary and Markov renewal processes. Dissert. Abstr.

N75-27404 George Washington Univ., Washington, D.C.
SOME NEW RESULTS IN THE STATISTICAL ANALYSIS OF STOCHASTIC PROCESSES OF THE RELIABILITY AND QUEUING TYPE Ph.D. Thesis
T. R. Thiagarajan 1975 107 p
Avail: Univ. Microfilms Order No. 75-14336

The usefulness is discussed of Gnedenko's F or ratio test for exponentiality with a stress on its application to the Weibull distribution. By a suitable transformation a Weibull density can be reduced to an exponential. Using this F procedure, the hypothesis that a given sample could have come from a Weibull population was tested. The power of the Gnedenko ratio test was calculated for the alternatives of Erlang and log-normal distributions, and compared to that of the appropriate Kolmogorov-Smirnov, Anderson-Darling, and other distance statistics. A second application is made in the field of queuing theory. Finally, computer programs in FORTRAN, which are necessary to obtain various results, are listed. Dissert. Abstr.

N75-27405# Eidgenossische Technische Hochschule, Zurich (Switzerland).
THE ELECTROMAGNETIC TESTING OF WIRE CABLES Ph.D. Thesis [DIE ELEKTROMAGNETISCHE PRUEFUNG VON DRAHTSEILEN]
Urs Balthasar Meyer 1973 179 p In GERMAN
(Rept-5014) Avail: NTIS HC $7.00

A nondestructive magnetoinductive testing method for wire cables of cable cars is reported that uses the current distribution field induced by a magnetic coil to detect crack formation.
Transl. by G.G.

N75-27406# Naval Postgraduate School, Monterey, Calif.
THE PERFORMANCE CHARACTERISTICS OF SOME RELIABILITY GROWTH MODEL Technical Report, Jan. - Dec. 1974
T. Jayachandran and L. R. Moore, III Dec. 1974 49 p refs
(RR0000110)
(AD-A004245; NPS-53JY74122) Avail: NTIS CSCL 14/4

A reliability growth model is an analytical model that accounts for changes in reliability due to design changes and other corrective actions taken during the development and testing phases of a reliability program. This paper describes the results of a Monte Carlo study comparing the performance characteristics of four reliability growth models that have been proposed in the reliability literature. GRA

N75-27407# Florida State Univ., Tallahassee. Dept. of Statistics.
APPLICATIONS OF MAJORIZATION AND SCHUR FUNCTIONS IN RELIABILITY AND LIFE TESTING Interim Report
Frank Proschan Nov. 1974 25 p refs
(Grant AF-AFOSR-2581-74; AF Proj. 9769)
(AD-A004325; FSU-Statistics-M322; TR-33;

AFOSR-75-0092TR) Avail: NTIS CSCL 14/4

This is an expository paper presenting basic definitions and properties of majorization and Schur functions, and displaying a variety of applications of these concepts in reliability prediction and modelling, and in reliability inference and life testing. GRA

N75-27408# California Univ., Berkeley. Operations Research Center.

THEORY OF MAINTAINED SYSTEMS: DISTRIBUTION OF TIME TO FIRST SYSTEM FAILURE

Richard E. Barlow and Frank Proschan Dec. 1974 30 p refs (Contracts F33615-73-C-4078; N00014-69-A-0200-1070; NR Proj. 042-238)

(AD-A004210; ORC-74-36) Avail: NTIS CSCL 14/4

The distribution of time to first system failure is considered for systems whose repairable components are separately maintained. It is shown that if repairable components have exponential failure law while repair distributions have decreasing repair rate, then the distribution of time to first system failure is NBU (for new better than used). This result is used to provide useful bounds on the system failure distribution. Improved bounds for the exponential repair case are given. GRA

N75-27409# California Univ., Berkeley. Operations Research Center.

FAULT TREE ANALYSIS: RELIABILITY THEORY AND SYSTEMS SAFETY ANALYSIS

Purnendu Chatterjee Nov. 1974 130 p refs (Contracts N00014-69-A-0200-1036; F33615-73-C-4078; NR Proj. 042-238)

(AD-A004209; ORC-74-34) Avail: NTIS CSCL 14/4

In this report the author solves various problems in fault tree analysis and coherent structure theory. In Chapter 1, fault tree construction methodology and mathematical notations are presented. Chapter 2 deals with minimal cut sets. Two algorithms, complete with proofs, are presented. In Chapter 3, the concept of module and an algorithm to obtain the finest modular decomposition is presented. Its potential use in obtaining various systems characteristics efficiently is pointed out. The concept of module is similar to that of committee in Game Theory. In Chapter 4, various concepts of importance and methods for computing them are presented. GRA

N75-27410# George Washington Univ., Washington, D.C.

TIME SERIES ANALYSIS AND FORECASTING OF FAILURE RATE PROCESSES

Nozer D. Singpurwalla 16 Dec. 1974 28 p refs (Contract N00014-67-A-0214; F33615-74-C-4040; NR Proj. 347-020)

(AD-A004203; Serial-T-309) Avail: NTIS CSCL 12/1

In this paper the author describes a new method for analyzing failure data. This method is particularly useful for analyzing data which is contaminated due to inspection, maintenance, or reporting procedures. The method is based on the notion that the estimated failure rate is the realization of a stochastic process which is referred to as the failure rate process. In order to be able to account for contaminations of the type discussed above, one allows the failure rate process to include periodic and trend components. The failure rate process is approximated by an appropriate time series model of the type suggested by BOX and JENKINS (1969). Such an approach is novel for reliability applications and has potential for a different direction of research in reliability theory. GRA

N75-27411# Florida State Univ., Tallahassee. Dept. of Statistics.

ON A NONPARAMETRIC ESTIMATION OF THE FAILURE RATE FUNCTION

Ibrahim A. Ahmad and Pi-Erh Lin Oct. 1974 37 p refs (Grant AF-AFOSR-2581-74; AF Proj. 9769)

(AD-A004552; FSU-Statistics-M318; AFOSR-75-0094TR) Avail: NTIS CSCL 12/1

Based on a sequence of independent and identically distributed random variables from an absolutely continuous distribution function f(x) with the probability density function f(x), and estimate r bar (x) of the failure rate function $r(x) = f(x)/[1-F(x)]$ was given along with the asymptotic normality of r bar (x). It is shown that r bar (x) converges to r(x) strongly at the continuity point of f(x). Necessary and sufficient conditions for the strong uniform convergence are obtained. The asymptotic joint normality of the estimate evaluated at a finite set of distinct points of f(r) is established where f(x) is twice differentiable with bounded derivatives. GRA

N75-27412# Ogden Air Logistics Center, Hill AFB, Utah. Service Engineering Div.

TITAN 2: RELIABILITY AND AGING SURVEILLANCE PROGRAM (RASP) MANAGEMENT PLAN

Harold D. Matticks 2 Dec. 1974 46 p

(AD-A004839) Avail: NTIS CSCL 16/4

This document provides information on the management of the Titan II RASP Program. The plan delineates responsibilities, organization, test development and test conduct flow. GRA

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N75-27413 Washington Univ., St. Louis, Mo.

HIGH PRECISION RESPONSE SPECTRUM AND TIME HISTORY ANALYSIS OF SHELLS OF REVOLUTION WITH SPECIAL APPLICATION TO HYPERBOLIC COOLING TOWER ON DISCRETE SUPPORTS Ph.D. Thesis

Herman Suryoutomo 1974 493 p

Avail: Univ. Microfilms Order No. 75-14938

A finite element formulation of the linear and nonlinear dynamic response of thin to moderately thick shells of revolution subjected to earthquake or other time dependent external loads are derived. A doubly curved shell element, fully incorporating the actual geometrical data, is employed. High order polynomial comparison functions are used to represented the dependent variables in which only the coefficients of the first order terms are retained, irrespective of the order of polynomial approximations. The distributed loadings are discretized into equivalent concentrated nodal loads using a consistent technique. The kinematic condensation technique is employed at the element level to reduce the size of the problem. The specification of various interelement continuity conditions for curved rotational shell finite element models is studied using a quadratic programming format. Dissert. Abstr.

N75-27414*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

FRACTURE ANALYSIS OF VARIOUS CRACKED CONFIGURATIONS IN SHEET AND PLATE MATERIALS

J. C. Newman, Jr. Jul. 1975 33 p refs Presented at ASTM Symp. on Properties Related to Toughness, Montreal, Canada, 23-27 Jul. 1975

(NASA-TM-X-72709) Avail: NTIS HC $3.75 CSCL 20K

A two-parameter fracture criterion was derived which relates the linear-elastic stress-intensity factor at failure, the elastic nominal failure stress, and two material parameters. The fracture criterion was used previously to analyze fracture data for surface- and through-cracked sheet and plate specimens under tensile loading. The fracture criterion was applied to center-crack tension, compact, and notch-band fracture specimens made of steel, titanium, or aluminum alloy materials tested at room temperature. The fracture data included a wide range of crack lengths, specimen widths, and thicknesses. The materials analyzed had a wide range of tensile properties. Failure stresses calculated using the criterion agreed well (plus or minus 10 percent) with experimental failure stresses. The criterion was also found to correlate fracture data from different specimen types (such as center-crack tension and compact specimens), within plus or minus 10 percent for the same material, thickness, and test temperature. Author

N75-27415# Technische Hochschule, Darmstadt (West Germany).

A PRESENTATION FOR CALCULATING THE DEFLECTION

OF STEEL CONCRETE BEAMS USING PROBABILITY THEORY PRINCIPLES Ph.D. Thesis [EIN BEITRAG ZUR BERECHNUNG DER DURCHBIEGUNG VON STAHLBETON-BAUTEILEN AUF WAHRSCHEINLICHKEITSTHEORETISCHER GRUNDLAGE]
Robert Schack 14 Jan. 1974 193 p refs In GERMAN
Avail: NTIS HC $7.00

Bending deformation behavior of steel concrete beams under short impact loads is studied by considering the additional affect of cement on stress between cracks, if number and position of the cracks are known. Combinatorial and probability calculations on relative slip between steel-and cement-surface for a projected fracture pattern determine density-and ditribution-functions for each bending fracture. Transl. by G.G.

N75-27416# Eidgenossische Technische Hochschule, Zurich (Switzerland).
THE SPACE DATA BANK AS AN INSTRUMENT FOR THE CONSTRUCTION PLANNER WITH UNIVERSITY BUILDINGS AS AN EXAMPLE Ph.D. Thesis [DIE RAUMDATENBANK ALS INSTRUMENT DES BAUTRAEGERS DARGESTELLT AM BEISPIEL DES HOCHSCHULBAUES]
Georg Heinrich Steiner 1974 104 p In GERMAN
(Rept-5072) Avail: NTIS HC $5.25

A data bank system is reported for construction planners and architects that encompasses the basic principles of industrial quality, work space requirements and demands, and funding. Example calculations for planning an university complex by computer techniques contain definitions for projection, construction, appropriations, usage, requirements analysis, and programming. Transl. by G.G.

N75-27417# Katholieke Universiteit te Leuven (Belgium).
MODAL PARAMETERS OF MECHANICAL STRUCTURES
Patrick VanLoon Sep. 1974 254 p refs
Avail: NTIS HC $8.50 CSCL 20K

The theoretical aspects of damping are reviewed, and a technique for vibration analysis of machine tools (lathes, milling machines), employing mathematical models and computer programs, is presented. The technique utilizes a pulse-type forcing signal. A light-weight hammer is applied to the structure under investigation, and the resulting transient motion is recorded with a conventional transducer. The signals are then processed by a Fourier Analyzer. The technique reduces time as compared to the classical steady-state methods of investigation of structural vibrations. Numerical analyses are performed, and practical applications and test examples of the machines analyzed by the technique are shown. J.R.T.

N75-27418*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF FATIGUE IN A SHEET SPECIMEN WITH AN INTERFERENCE-FIT BOLT
John H. Crews, Jr. Washington Jul. 1975 29 p refs
(NASA-TN-D-7926; L-10067) Avail: NTIS HC $3.75 CSCL 20K

A fatigue analysis, based on finite-element calculations and fatigue tests, was conducted for an aluminum-alloy sheet specimen with a steel interference-fit bolt. The stress analysis of the region near the bolt hole showed that the beneficial effect of an interference-fit bolt can be interpreted as the combined result of two effects: (1) load transfer through the bolt and (2) the compressive interference stresses in the sheet. Results of the fatigue tests show that progressively higher interference levels produced longer fatigue lives. The tests also show that a high level of interference prevents fretting at the bolt-sheet interface and that interferences larger than this level produced little additional improvement in fatigue life. Author

N75-27419*# Grumman Aerospace Corp., Bethpage, N.Y.
NUMERICAL NONLINEAR INELASTIC ANALYSIS OF STIFFENED SHELLS OF REVOLUTION. VOLUME 1: THEORY MANUAL FOR STARS-2P DIGITAL COMPUTER PROGRAM
V. Svalbonas and H. Levine Washington NASA Jul. 1975 52 p refs
(Contract NAS8-28569)
(NASA-CR-2559-Vol-1) Avail: NTIS HC $4.25 CSCL 20K

The theoretical analysis background for the STARS-2P nonlinear inelastic program is discussed. The theory involved is amenable for the analysis of large deflection inelastic behavior in axisymmetric shells of revolution subjected to axisymetric loadings. The analysis is capable of considering such effects as those involved in nonproportional and cyclic loading conditions. The following are also discussed: orthotropic nonlinear kinematic hardening theory; shell wall cross sections and discrete ring stiffeners; the coupled axisymmetric large deflection elasto-plastic torsion problem; and the provision for the inelastic treatment of smeared stiffeners, isogrid, and waffle wall constructions. Author

N75-27420*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
BUCKLING TESTS OF THREE 4.6 METER DIAMETER ALUMINUM HONEYCOMB SANDWICH CONICAL SHELLS LOADED UNDER EXTERNAL PRESSURE
James Kent Anderson and Randall C. Davis Washington Jul. 1975 100 p refs
(NASA-TN-D-7935; L-9936) Avail: NTIS HC $4.75 CSCL 20K

Three aluminum honeycomb sandwich conical shells with a 120 apex angle and a 4.6-m (15.0-ft) base diameter were loaded to failure by a uniform external pressure. The cones differed from one another only in the thickness of their respective face sheets. Test specimen details, test procedure, and test results are discussed. Both buckling and prebuckling data are compared with appropriate theoretical predictions, and good agreement was obtained between test and theory. Extensive imperfection measurements were made and reported on the three cones in the as fabricated condition. Author

N75-27421*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYSIS OF THE EFFECTS ON LIFE OF LEADING-EDGE HOLES IN AN AIRFOIL SUBJECTED TO ARBITRARY SPANWISE AND CHORDWISE TEMPERATURE DISTRIBUTIONS
Albert Kaufman Washington Jul. 1975 17 p refs
(NASA-TM-X-3257; E-8277) Avail: NTIS HC $3.25 CSCL 01C

The effects of temperature gradients, cooling-hole rim and bulk metal temperatures, and mechanical stress were investigated by using a finite-element structural analysis of a symmetrical airfoil with and without leading-edge holes. The results indicate that leading-edge film cooling is beneficial when large chordwise temperature gradients exist and if the cooling-hole rim temperatures are above the bulk metal temperature. The effects of film cooling at other locations on the airfoil were not considered, and the relative merits of convection or film cooling at the leading edge, in terms of allowable turbine inlet temperature or coolant flow requirements, were not evaluated. Author

N75-27422*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ANALYTICAL MODELING REQUIREMENTS FOR TILTING PROPROTOR AIRCRAFT DYNAMICS
Wayne Johnson Washington Jul. 1975 59 p refs Prepared in cooperation with Army Air Mobility R and D Lab., Moffett Field, Calif.
(NASA-TN-D-8013; A-5698) Avail: NTIS HC $4.25 CSCL 01A

Proprotor and cantilever wing aeroelastic behavior is applied to a gimballed rotor and a hingeless rotor to develop an analytical model for prediction of tilting proprotor aircraft dynamics. Particular attention is given to: the influence of coupled flap/lag bending modes; the influence of rotor blade torsion degrees of freedom on proprotor dynamics; and, to a constant coefficient approximation representing the dynamics in nonaxial flow through the rotor. The following are also examined: the number of blade bending and torsion modes required; the influence of the rotor aerodynamic model; the influence of the blade trim bending deflection; the importance of the rotor rotational speed degree of freedom; and the effect of the wing aerodynamic forces. The origin of the significant influence of the blade pitch motion on the proprotor dynamics is discussed. Author

N75-27423*# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
PREDICTION AND VERIFICATION OF CREEP BEHAVIOR IN METALLIC MATERIALS AND COMPONENTS FOR THE SPACE SHUTTLE THERMAL PROTECTION SYSTEM. VOLUME 2: PHASE 2 SUBSIZE PANEL CYCLIC CREEP PREDICTIONS Summary Report, Jul. 1973 - Nov. 1974
B. A. Cramer and J. W. Davis Washington NASA Jun. 1975 85 p refs
(Contract NAS1-11774)
(NASA-CR-132605-2) Avail: NTIS HC $4.75 CSCL 20K

A method for predicting permanent cyclic creep deflections in stiffened panel structures was developed. The resulting computer program may be applied to either the time-hardening or strain-hardening theories of creep accumulation. Iterative techniques were used to determine structural rotations, creep strains, and stresses as a function of time. Deflections were determined by numerical integration of structural rotations along the panel length. The analytical approach was developed for analyzing thin-gage entry vehicle metallic-thermal-protection system panels subjected to cyclic bending loads at high temperatures, but may be applied to any panel subjected to bending loads. Predicted panel creep deflections were compared with results from cyclic tests of subsize corrugation and rib-stiffened panels. Empirical equations were developed for each material based on correlation with tensile cyclic creep data and both the subsize panels and tensile specimens were fabricated from the same sheet material. For Vol. 1, see N75-21431. Author

N75-27424# Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.
STRESS ANALYSIS OF A CONCAVE POLYHEDRAL SHELL
Kazuo Tanizawa and Miura Koryo Mar. 1975 23 p refs Repr. from Inst. of Space and Aeron. Sci. Report 523 (Tokyo), v. 40, no. 3, Mar. 1975 p 39-60
(ISAS-523-Vol-40-3) Avail: NTIS HC $3.25

The stress analysis of the PCCP shell, concave polyhedral shell, is presented. Both the numerical method and the experimental method are used in the analysis. The elastic behaviour and stress distributions of the PCCP shell subjected to either axial compression or hydrostatic pressure are determined. The higher buckling pressures of PCCP shells in comparison with that of the circular cylinder are obtained experimentally. It was found that the particular stress distribution observed in PCCP shells in axial compression gave a basis for Miura's hypothesis to explain the collapsing mechanism of general cylindrical shells. Author

N75-27425*# Lehigh Univ., Bethlehem, Pa. Dept. of Engineering and Mechanics.
DUCTILE FRACTURE THEORIES FOR PRESSURIZED PIPES AND CONTAINERS
F. Erdogan Jul. 1975 45 p refs Presented at 3d Intern. Conf. on Structural Mech. in Reactor Technol., London, Sep. 1975
(Grants NGR-39-007-011; NSF GK-42771X)
(NASA-CR-143112) Avail: NTIS HC $3.75 CSCL 20K

Methods-KR characterization, J integral, and plastic instability-used to analyze plane stress type fractures in structural components are explained. Special attention was given to shell fracture. Author

N75-27426*# Boeing Aerospace Co., Seattle, Wash. Research and Engineering Div.
BOPACE 3-D (THE BOEING PLASTIC ANALYSIS CAPABILITY FOR 3-DIMENSIONAL SOLIDS USING ISOPARAMETRIC FINITE ELEMENTS) Final Report
R. G. Vos and J. W. Straayer 15 Apr. 1975 360 p refs
(Contract NAS8-30615)
(NASA-CR-143891; D180-18677-1) Avail: NTIS HC $10.00 CSCL 20K

The BOPACE 3-D is a finite element computer program, which provides a general family of three-dimensional isoparametric solid elements, and includes a new algorithm for improving the efficiency of the elastic-plastic-creep solution procedure. Theoretical, user, and programmer oriented sections are presented to describe the program. Author

N75-27427*# Rocketdyne, Canoga Park, Calif.
VALIDATION TESTING OF SHALLOW NOTCHED ROUND-BAR SCREENING TEST SPECIMENS
G. A. Vroman 6 Jun. 1975 21 p
(Contract NAS8-27980)
(NASA-CR-143897; R-9743) Avail: NTIS HC $3.25 CSCL 20K

The capability of shallow-notched, round-bar, tensile specimens for screening critical environments as they affect the material fracture properties of the space shuttle main engine was tested and analyzed. Specimens containing a 0.050-inch-deep circumferential sharp notch were cyclically loaded in a 5000-psi hydrogen environment at temperatures of +70 and -15 F. Replication of test results and a marked change in cyclic life because of temperature variation demonstrated the validity of the specimen type to be utilized for screening tests. Author

N75-27428*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EXPERIENCES IN USING MODAL SYNTHESIS WITHIN PROJECT REQUIREMENTS
J. A. Garba, B. K. Wada, and J. C. Chen 1 Jun. 1975 37 p refs
(Contract NAS7-100)
(NASA-CR-143132; JPL-TM-33-729) Avail: NTIS HC $3.75 CSCL 20K

Modal synthesis methods were developed for use by engineers for cost-effective solutions of large structural dynamics problems. Different methods were proposed by various investigators based upon comparative solutions of relatively simple structures using different forms of displacement functions. The application of modal synthesis methods to a large complex structure in a project environment is described. The considerations include analysis, hardware interfaces, schedules, tests, resources, and other project requirements. Good technical results were obtained through the use of an integrated analysis/test modal synthesis on both substructures and systems. Author

N75-27429*# Cornell Univ., Ithaca, N.Y.
A TRIANGULAR THIN SHELL FINITE ELEMENT: LINEAR ANALYSIS
G. R. Thomas and R. H. Gallagher Washington NASA Jul. 1975 45 p refs
(Grant NGL-33-010-070)
(NASA-CR-2482) Avail: NTIS HC $3.75 CSCL 20K

The formulation of the linear stiffness matrix for a doubly-curved triangular thin shell element, using a modified potential energy principle, is described. The strain energy component of the potential energy is expressed in terms of displacements and displacement gradients by use of consistent Koiter strain-displacement equations. The element inplane and normal displacement fields are approximated by complete cubic polynomials. The interelement displacement admissibility conditions are met in the global representation by imposition of constraint conditions on the interelement boundaries; the constraints represent the modification of the potential energy. Errors due to the nonzero strains under rigid body motion are shown to be of small importance for practical grid refinements through performance of extensive comparison analyses. Author

N75-27430*# Cornell Univ., Ithaca, N.Y.
A TRIANGULAR THIN SHELL FINITE ELEMENT: NONLINEAR ANALYSIS Final Report
G. R. Thomas and R. H. Gallagher Washington NASA Jul. 1975 69 p refs
(Grant NGL-33-010-070)
(NASA-CR-2483) Avail: NTIS HC $4.25 CSCL 20K

Aspects of the formulation of a triangular thin shell finite element which pertain to geometrically nonlinear (small strain, finite displacement) behavior are described. The procedure for solution of the resulting nonlinear algebraic equations combines a one-step incremental (tangent stiffness) approach with one iteration in the Newton-Raphson mode. A method is presented which permits a rational estimation of step size in this procedure. Limit points are calculated by means of a superposition scheme coupled to the incremental side of the solution procedure while bifurcation points are calculated through a process of interpolation of the determinants of the tangent-stiffness matrix. Numerical results are obtained for a flat plate and two curved

shell problems and are compared with alternative solutions.
Author

N75-27431# California Univ., Berkeley. Lawrence Berkeley Lab.
FRACTURE OF BRITTLE SOLIDS UNDER MULTIAXIAL AND DYNAMIC LOADING Ph.D. Thesis
O. Vadar Feb. 1975 116 p refs
(Contract W-7405-eng-48)
(LBL-3240) Avail: NTIS HC $5.25

Weibull's statistical treatment is employed in studying the behavior of brittle solids under static multiaxial loading. The response of cracks to short duration tensile loading is examined, and a new theory is developed for predicting failure in brittle solids due to uniaxial dynamic loading. It is pointed out that the Weibull multiaxial treatment of brittle strength contains limitations which are not present in the more familiar uniaxial formulation. Provided these limitations are satisfied, it is possible to use tension or bending data to predict multiaxial behavior when at least one principal stress is tensile. A simple, new theory is proposed which relates the strength of brittle solids to the duration of the applied loading. Results from the experiments in which rocks are exposed to intense short duration electron beams are predicted successfully using this theory.
Author (NSA)

N75-27432# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EQUATION OF STATE STATIC AND DYNAMIC PROBLEMS OF THERMOPLASTICITY UNDER COMPLEX LOADING
Yu. G. Korotkikh and S. M. Belevich 26 Nov. 1974 20 p refs Transl. into ENGLISH from Uch. Zap. Gorkovskii Gos. Univ. (USSR), no. 108, 1970 p 80-90
(FTD Proj. T74-02-15)
(AD-A004433; FTD-MT-24-2514-74) Avail: NTIS CSCL 20/12

Stress-strain tensors, plastic deformation, and static and dynamic problems of thermoplasticity are examined. Attempts, made to derive the relationship between increases in the stress and strain tensors without relying on the assumption of their smallness, are reported. Physical algorithms of practical relization of these relationships when solving thermoplasticity problems are given.
E.H.W.

N75-27433# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATION OF THE PLANE STRESSED STATE OF PLATES FROM NONLINEARLY DEFORMED ANISOTROPIC MATERIALS
A. G. Ugodchikov, Yu. M. Kulagin, and A. N. Pautov 26 Nov. 1974 10 p refs Transl. into ENGLISH from Soprotivlenie Materialov i Teorii Sooruzhenii (USSR), no. 16, 1972 p 131-134
(FTD Proj. T74-02-15)
(AD-A004441; FTD-MT-24-2505-74) Avail: NTIS CSCL 20/12

The approximation theory of nonlinear elasticity and plasticity of anistropic bodies and their alloys was used to calculate the plane stress state of plates. Boundary conditions for the stress function and its normal derivative are established. Also, a numerical solution was plotted in the orthogonal coordinate system for regions with curvilinear boundaries.
E.H.W.

N75-27434# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
NUMERICAL SOLUTIONS TO INTEGRAL EQUATIONS OF FRACTURE MECHANICS M.S. Thesis
Walter R. King Sep. 1974 109 p refs
(AD-A004323; GA/MC/74-4) Avail: NTIS CSCL 20/11

The Integral Equation method developed by Major Montulli allows solution for Stress Intensity Factors for closed crack, general shaped bodies. This thesis studies one complete example problem using the Integral Equation method for a closed crack, right circular cylindrical geometry. In addition, techniques and computer software are developed for use with the example problem and for any future practical problems that may be studied.
GRA

N75-27435# Naval Ship Research and Development Center, Bethesda, Md. Computation and Mathematics Dept.
PROCEEDINGS OF THE NAVY-NASTRAN COLLOQUIUM, 5TH
10 Sep. 1974 139 p refs Proc. held at Bethesda, Md., 10 Sep. 1974
(AD-A004804; CMD-32-74) Avail: NTIS CSCL 20/11

Papers given at the colloquium are presented. Topics discussed include NASTRAN pre- and postprocessors; plans for the Navy laboratory computer network (NALCON); applications of NASTRAN in nonlinear analysis using ring elements including aspect ratio effects; conversion of NASTRAN to the Honeywell H-6000; data generators for NASTRAN; transient analysis of bodies with moving boundaries using NASTRAN; comparison of vibration shaker test measurements with NASTRAN dynamic analyses for an optical bench; solution of a large transient, thermal, and thermal-stress problem with NASTRAN; NASTRAN structural analysis of the M-109 Al elevating; failure prediction for damage aircraft wings; fluid-structure interaction solutions using finite elements; the transient interaction of axisymmetric structures with fluids; response of plates to random pressure loading from a turbulent boundary layer; and NASTRAN static and dynamic analysis of the GEOS-C spacecraft.
GRA

N75-27436# Texas Univ., Austin. Inst. for Computational Mechanics.
A THEORY OF MIXED FINITE ELEMENT APPROXIMATIONS OF NON-SELF-ADJOINT BOUNDARY VALUE PROBLEMS
J. T Oden Sep. 1974 40 p refs
(Grant AF-AFOSR-2660-74; AF Proj. 9782)
(AD-A004154; TICOM-74-4; AFOSR-75-0052TR) Avail: NTIS CSCL 12/1

A theory was developed of mixed finite element approximations of nonself-adjoint boundary value problems of the form $STu = f$ and applications of that theory to problems in solid mechanics. Some of the results explain phenomena which were observed for some time in actual applications in mixed models, including instabilities in certain cases, and the strong dependence of the accuracy of the polynomial used in approximating the highest derivatives. A theory of multiple decompositions is also given.
GRA

N75-27437# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
BUCKLING, PREBUCKLING AND VIBRATION OF STIFFENED AND UNSTIFFENED SHELLS Final Report, 16 Sep. 1972 - 30 Jun. 1974
Josef Singer and Menahem Baruch Aug. 1974 28 p
(Grant AF-AFOSR-2394-72; AF Proj. 6813; AF Proj. 9782)
(AD-A003720; TAE-228; AFOSR-75-0023TR) Avail: NTIS CSCL 20/11

The stability and vibrations of stiffened and unstiffened shells and panels under axial compression are studied. The thermal buckling of shells under combined mechanical load and heating is also investigated. The studies include theoretical and experimental work, with emphasis on correlation between vibrations and buckling. Eccentricity of loading is also considered. Methods for nondestructive determination of buckling loads for bars, plates and shells are developed. A new incremental theory for the nonlinear elasto-plastic behavior of structures has been developed and is applied to some problems. The influence of initial imperfections on vibrations and stability is also studied.
GRA

N75-27438# Pennsylvania State Univ., University Park.
CHARACTERIZATION OF PAVEMENT MACROTEXTURE BY PROFILE SPECTRAL ANALYSIS Final Report
James M. Lawther and John J. Henry Jun. 1974 93 p refs Sponsored in part by Office of the Secretary of Transportation
(Contract DOT-C-35996)
(COM-75-10341/1; NBS-GCR-75-35) Avail: NTIS HC $4.75 CSCL 13B

The feasibility of using a profile tracer to measure pavement macrotexture was investigated. Four test pavements--part of the Pennsylvania Transportation Institute Skid Test Facility--were measured and spectrum analysis plots of the pavement profiles are presented. In addition, space frequency spectrum analyses of the profiles were generated and site-to-site comparisons were

made. The results are presented in terms of their potential relationship to tire noise. GRA

N75-27439# Transport and Road Research Lab., Crowthorne (England).
SYNTHETIC AGGREGATES OF HIGH RESISTANCE TO POLISHING. PART 3: POROUS AGGREGATES
J. R. Hosking 1974 31 p refs
(PB-239454/2; TRRL-LR-655-Pt-3) Avail: NTIS HC $3.75 CSCL 13C

The report describes research carried out on a group of roadstones which owe their high polish-resistance to their vesicular or porous nature. Presently broken materials of this type have a rough micro-texture which is largely retained through progressive exposure of sections of pores as wear takes place. Although it improves resistance to polishing, the introduction of pores into a material tends to reduce its strength and resistance to abrasion. The extent of this reduction has to be carefully balanced against the gain in resistance to polishing if a successful material is to be developed. GRA

N75-27440# Transport and Road Research Lab., Crowthorne (England).
SYNTHETIC AGGREGATES OF HIGH RESISTANCE TO POLISHING. PART 4: SPECIALLY SHAPED CHIPPINGS
J. R. Hosking and F. A. Jacobs 1974 19 p refs
(PB-239453/4; TRRL-LR-656) Avail: NTIS HC $3.25 CSCL 13C

This report describes work that was carried out to study the effect of the geometric shape of synthetic chippings on their performance in the road surface. It was found that, of the shapes studied, cylinders and hexagonal prisms gave the best texture-depth consistent with large surface area of aggregate at the road surface. The effect of a range of differently shaped chippings on the skid-resistance and texture of asphalt surfacings, is studied. GRA

N75-27441# Alabama Univ., University. Bureau of Engineering Research.
BASIC RESEARCH IN METHODS OF APPROXIMATION IN THE NONLINEAR MECHANICS OF SOLIDS AND STRUCTURES. VOLUME 3: TRANSIENT ANALYSES Final Report
Thomas L. Cost and George E. Weeks Oct. 1974 132 p refs
(Contract F44620-69-C-0124; AF Proj. 6813)
(AD-A004146; BER-184-07; AFOSR-75-0090TR) Avail: NTIS CSCL 20/11

Results from six different phases of research activity related to the nonlinear mechanics of solids and structures are presented. These phases include analyses of: (1) geometrically nonlinear viscoelastic structures, (2) dynamic response of prestressed structures, (3) thermomechanical dissipation phenomena, (4) coupled heat and moisture diffusion, (5) temporal operators for nonlinear problems, and (6) finite element models for shell structures. Each phase demonstrates analysis method for the particular topic of interest. Each phase is separate and self-contained. GRA

N75-27442# California Univ., Berkeley.
AN INVESTIGATION OF THE EFFECTIVENESS OF EXISTING BRIDGE DESIGN METHODOLOGY IN PROVIDING ADEQUATE STRUCTURAL RESISTANCE TO SEISMIC DISTURBANCES. PHASE 3: ANALYTICAL INVESTIGATIONS OF SEISMIC RESPONSE OF SHORT, SINGLE, OR MULTIPLE-SPAN HIGHWAY BRIDGES Final Report
M. Chen and J. Penzien Oct. 1974 176 p refs
(Contract DOT-FH-11-7798)
(PB-240698/1; FHWA-RD-75-10) Avail: NTIS HC $7.00 CSCL 13B

Descriptions are given to the analytical investigations of the seismic response of short, single or multiple-span highway bridges of the type where soil-structure interaction effects are important. Six different mathematical model elements are incorporated into the computer program which possess the capability of performing linear or nonlinear analyses. Finite element modeling is used for the backfill soils. Bridge deck, piers, and abutments are modeled using prismatic beam elements. A frictional element is used to model the discontinuous behavior at the interface of backfill soils and abutments. Discontinuous type expansion joint elements are also included. GRA

N75-27443# California Univ., Berkeley. Earthquake Engineering Research Center.
DYNAMIC BEHAVIOR OF A MULTISTORY PYRAMID-SHAPED BUILDING
R. M. Stephen, J. P. Hollings, and J. G. Bouwkamp Sep. 1974 108 p refs
(Grant NSF GK-31883)
(PB-240718/7; EERC-73-17) Avail: NTIS HC $5.25 CSCL 13B

This report describes the experimental and analytical studies of the dynamic behavior of the Transamerica Building, a multistory pyramid-shaped steel structure, sixty stories in height, located in San Francisco, California. The 853 foot high building has a square plan, 174 feet by 174 feet and consists of a two-story high ground floor, a triangularly shaped tubular space truss around the perimeter between the 2nd and 5th floor levels, and above this level, a moment resistance frame with the exterior walls sloping inward at an approximate ratio of 1 to 11. The experimental work consisted of both forced vibration and ambient strudies in which the natural frequencies, mode shapes, and damping values are determined. GRA

42 GEOSCIENCES (GENERAL)

N75-27444# Joint Publications Research Service, Arlington, Va.
SOVIET ANTARCTIC INFORMATION BULLETIN
11 Jun. 1974 28 p refs Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 14-17, 29-34, 59-64, 102-109
(JPRS-64980) Avail: NTIS HC $3.75

Studies were performed in the Antarctic region and results are presented for the following topics: the distribution of sea ice; the propagation of short radio waves between Antarctic stations; photogrammetric studies of the Seventeenth Soviet Antarctic Expedition; glaciological-geodetic investigations on the Hays Glacier; the use of satellite data in transversing drift ice; observations using French electronic equipment and the EOLE satellite. For individual titles, see N75-27445 through N75-27449.

N75-27445 Joint Publications Research Service, Arlington, Va.
DISTRIBUTION OF ANTARCTIC SEA ICE DETERMINED USING SATELLITE OBSERVATIONS c48
V. V. Yevseyev *In its* Soviet Antarctic Inform. Bull. (JPRS-64980) 11 Jun. 1975 p 1-5 Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 14-17 (For availability see N75-27444 18-42)

From 1970 through 1971 satellite information was used for studying the peculiarities of the distribution of Antarctic sea ice during the entire year. As a result of analysis of television photographs it became clear that in late February-early March only residual ice was observed in Eastern Antarctica. Young ice appears in mid-March in many regions. In April an ice cover was observed along the entire coast of eastern Antarctica. During the month its outer boundary was shifted an average of 75 miles to the north. It was displaced approximately the same distance in May. Results of other monthly observations are also presented. Author

N75-27446 Joint Publications Research Service, Arlington, Va.
MECHANISM OF PROPAGATION OF SHORT RADIO WAVES BETWEEN IRKUTSK AND BELLINSGAUZEN IN ANTARCTICA c32
L. P. Kuperov *In its* Soviet Antarctic Inform. Bull. (JPRS-64980) 11 Jun. 1975 p 6-14 Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 29-34 (For availability see N75-27444 18-42)

The Soviet Antarctic station Bellinsgauzen was established as a comparator point for investigating the propagation of a short wave along antipodal trajectories between Irkutsk and

Bellinsgauzen stations. During the period from December 1969 through January 1972, the field strength of the field for the Irkutsk radio transmitter was registered at a frequency of 10,000 kHz, operating in a program of transmission of precise time signals. The program included the radiation of nonattenuating oscillations for a period of 10 minutes. The propagation of radio waves was shown to occur along a circle consisting of two trajectories, one 18,4000 km and the other 21,600 km. The propagation of radio signals 10 mHz along the larger circle between the two stations occurred completely in the ionosphere without reflections from the earth. Author

N75-27447 Joint Publications Research Service, Arlington, Va.
GLACIOLOGICAL-GEODETIC INVESTIGATIONS ON HAYS GLACIER IN 1972 c46
Z. Meyer *In its* Soviet Antarctic Inform. Bull. (JPRS-64980) 11 Jun. 1975 p 15-19 refs Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 61-64 (For availability see N75-27444 18-42)

The Hays glacier, a tongue formation situated 15 km to the east of Molodezhnaya station, was examined from December 1971 through March 1973. The glacier was studied at portable camp sites and through aerial photographic survey for: morphology (its thickness and productivity): determination of the form and parameters of glacier movement; structure and physical-mechanical properties of surface layers of the glacier thickness; and, refraction. The Hays glacier was found to be a small, active glacier which most likely favors melting at the lower boundary of the ice. Annual runoff, snow accumulation, and the effects of winds and other meterological occurrences were also determined. Author

N75-27448 Joint Publications Research Service, Arlington, Va.
EXPERIENCE IN USING SATELLITE DATA IN TRAVERSING ANTARCTIC DRIFT ICE DURING THE 1970-1971 NAVIGATION SEASON c48
V. V. Yevseyev *In its* Soviet Antarctic Inform. Bull. (JPRS-64980) 11 Jun. 1975 p 20-22 Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 102-104 (For availability see N75-27444 18-42)

Characteristics of ice conditions during 1970 through 1971 are given, based on an analysis of satellite information and its use in conducting ships through drifting ice. A diesel-electric ship was provided with information from the Molodezhnaya station concerning the nature and distribution of a large zone of continuous drift ice. Satellite information was transmitted directly shipboard, and recommendations on the most advantageous region for traversing the drifting ice were received and successfully followed. Author

N75-27449 Joint Publications Research Service, Arlington, Va.
OBSERVATIONS USING FRENCH ELECTRONIC EQUIPMENT AND THE EOLE SATELLITE c43
I. V. Farengolts *In its* Soviet Antarctic Inform. Bull. (JPRS-64980) 11 Jun. 1975 p 23-27 refs Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 105-109 (For availability see N75-27444 18-42)

On August 16, 1971 a meteorological satellite was launched from Wallops Island to study the atmosphere over the Southern Hemisphere, to collect information on pressure and temperature, and to observe glaciology, geodesy, oceanography, and interaction between the atmosphere and ocean. Through cooperation with Argentina, Great Britain, U.S.S.R., U.S., France, Australia, and Japan, the satellite tracking of iceberg drift was accomplished using electronic buoys. Continuous information on the Antarctic circumpolar current was obtained for use in polar expeditions. Author

N75-27450# Joint Publications Research Service, Arlington, Va.
METEOROLOGY AND HYDROLOGY, NO. 4, 1975
Ye. I. Tolstikov, ed. 9 Jul. 1975 178 p refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 (JPRS-65174) Avail: NTIS HC $7.00

Articles are presented on microclimate, agricultural meteorology, weather forecasting and climate control, hydrological forecasting, the activities and personnel of the Soviet Hydrometeorological Service, and new publications. For individual titles, see N75-27451 through N75-27465.

N75-27451 Joint Publications Research Service, Arlington, Va.
SPREAD OF INDUSTRIAL MOISTURE DISCHARGE IN THE ATMOSPHERE AND ITS EFFECT ON THE DISPERSION OF POLLUTANTS c45
M. Ye. Berlyand and V. B. Kiselev *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 1-16 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 3-15 (For availability see N75-27450 18-42)

Derivation is presented and the numerical solution found for the system of equations of the spread of moisture from industrial sources; the processes of condensation, coagulation, and precipitation of water drops are considered. The calculation is made for a number of characteristic cases and the results are analyzed and compared with the operation data. The effect of the absorption of a light pollutant by water drops on its ground concentration is estimated. Author

N75-27452 Joint Publications Research Service, Arlington, Va.
STATISTICAL ANALYSIS OF TRAVELING PLANETARY WAVES c48
M. I. Fortus *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 17-24 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 16-22 (For availability see N75-27450 18-42)

The method of empirical orthogonal functions (natural components) was used to determine the most informative components of meteorological fields and to study traveling planetary waves. The results are presented and discussed. M.J.S.

N75-27453 Joint Publications Research Service, Arlington, Va.
NUMERICAL EXPERIMENTS IN THE CALCULATION OF NONSTATIONARY GRAVITY WAVES IN THE FREE ATMOSPHERE c46
V. Z. Kiselnikova *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 25-33 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 23-30 (For availability see N75-27450 18-42)

The results of numerical experiments for calculating nonstationary gravity waves in a free atmosphere are described. The expressions were obtained for the time that the lee waves became stationary as a function of the values of the parameter D(2), and the magnitude of the disturbances as a function of the structure of the boundary condition at the lower boundary. Author

N75-27454 Joint Publications Research Service, Arlington, Va.
EFFECT OF THE CURVATURE OF THE MOISTURE PROFILE ON THE INITIAL STAGE OF CELLULAR CONVECTION c46
A. P. Khain *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 34-44 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 31-38 (For availability see N75-27450 18-42)

A linear analysis is presented of the stability of the convective layer by considering the curvature of the vertical humidity profile. It is shown that the presence of a vertical gradient of the humidity decreases the critical value of the temperature gradient, and the loss of stability of the convective layer takes place. On the basis of approximate analytical solutions and numerical experiments, it is shown that the curvature of the humidity profile has a destabilizing effect on the convection and shifts the critical wavelength in the direction of shorter wavelengths. Author

N75-27455 Joint Publications Research Service, Arlington, Va.
DAY-TO-DAY VARIABILITY OF THE TOTAL OZONE CONTENT BY SEASONS AND SEA LEVEL PRESSURE c46
L. A. Uranova *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 45-54 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 39-46 (For availability see N75-27450 18-42)

In order to find the seasonal nature of the interdiurnal variability of the total ozone content, two cases were investigated with a variability greater than 0.080 cm/day for the period from

1965 to 1970. It was found that in all cases of ozone variability of more than 0.080 cm/day, positive variability of the sea level pressure was observed on the following day. Data tables of the results are presented and analyzed. M.J.S.

N75-27456 Joint Publications Research Service, Arlington, Va.
STATISTICAL METHODS OF GROUPING THE RAINDROP SPECTRA **c47**
V. V. Tsykunov *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 55-64 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 47-54 (For availability see N75-27450 18-42)

A study was made of the possibility of applying the Kolmogorov-Smirnov lambda-criterion to check the zero hypothesis of the belonging of two empirical raindrop distributions (with respect to size) to one general distribution. To obtain representative data the results of individual measurements are grouped, and the mean spectrum is constructed under the assumption that the grouped spectra belong to one general distribution. The basis for this proposition is equality (in some range of values) of the intensity of the rain for which the spectra are measured. The selection of the intensity is explained by the fact that this value has a clear physical meaning; it is one of the basic characteristics of liquid precipitation and can be measured instrumentally, and is calculated by the measured spectrum. Author

N75-27457# Joint Publications Research Service, Arlington, Va.
HEAT TRANSFER FROM A WAVY SURFACE WITH UNSTABLE STRATIFICATION **c34**
V. N. Domanov and V. I. Zhadan *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 65-72 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 55-61 (For availability see N75-27450 18-42)

Data are presented from experimental studies of the kinematic characteristics of the air flow over a solid wavy surface (both heated and unheated). The effect of the thermal stratification on the kinematic characteristics and on the coefficients of resistance and heat exchange was investigated. Author

N75-27458 Joint Publications Research Service, Arlington, Va.
CALCULATING THE WINTER CIRCULATION IN THE NORTH ATLANTIC **c47**
A. S. Sarkisyan and A. Stashkevich *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 73-84 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 62-70 (For availability see N75-27450 18-42)

The results are presented from calculating the water circulation in the North Atlantic with respect to the given density field for the winter season on a 2.5 degree stepsize grid. The comparison with the results of analogous calculations with a stepsize twice as small shows that in the open sea (when describing the large scale circulation) it is sufficient to use the calculated grid with the 2-3 degree stepsize which saves computer memory. Author

N75-27459 Joint Publications Research Service, Arlington, Va.
STUDY OF THE TURBULENCE OF A ROUGH CURRENT WITH INCREASED BOTTOM IRREGULARITY **c34**
N. A. Mikhaylova and D. N. Nabotov *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 85-92 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 71-76 (For availability see N75-27450 18-42)

Knowledge of kinematic characteristics of rough currents was used to solve such applied problems as the calculation of channel erosion in rivers and canals, the transport of alluvium, and mass and heat exchange. It was found that it is necessary to obtain quantitative relations relating these characteristics to the average flow characteristics (depth, velocity), which were determined when performing hydrologic or hydroengineering studies. The criterion combining the indicated values and characterizing the degree of roughness of the current is the Froude number. Equalization of the turbulence components in rough currents with increased bottom irregularity was noted. Author

N75-27460 Joint Publications Research Service, Arlington, Va.
FREEZING OF RIVERS WITH AND WITHOUT THE FORMATION OF JAMS **c43**
I. Ya. Liser *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 93-111 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 77-83 (For availability see N75-27450 18-42)

A study is made of the basic factors determining the type of freezing of rivers, and quantitative relations are proposed for estimating the type. A method of calculating the current velocity in front of the edge of the freeze-up is recommended. The different nature of freezing causes significant differences in the hydrologic regime of the river during this period. A rise in water level during the freeze-up, the speed at which the edge advances, the initial thickness of the ice, and other characteristics differ sharply when freeze-up takes place with and without jam formation. The differences in the ice conditions during the freeze-up make an impression on the regime of the following period, to opening of the river. Author

N75-27461 Joint Publications Research Service, Arlington, Va.
DYNAMICS OF ATMOSPHERIC PROCESSES IN THE 5-15 DEG LATITUDE TROPICAL ZONE **c47**
Ye. M. Dobryshman *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 112-120 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 91-96 (For availability see N75-27450 18-42)

On the basis of analyzing the equations of atmospheric dynamics for the 5-15 deg latitude tropical zone, conclusions were drawn regarding the characteristics of the pressure, wind, and temperature fields. Part of them were confirmed by the empirical data, and others required careful processing of the observation results obtained during the TROPEX-72 and TROPEX-74 expeditions. It is shown that the semidiurnal period in the wind and pressure fields corresponds to the frequency of the natural fluctuations of the atmosphere; these are forced fluctuations in the temperature field. Author

N75-27462 Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF VARYING THE SALT EXCHANGE BETWEEN THE BLACK AND AZOV SEAS BY CREATING A FRESHWATER BUFFER ZONE **c48**
I. A. Shlygin *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 121-127 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 97-100 (For availability see N75-27450 18-42)

The possibility is discussed of decreasing the salinity of the Azov Sea by transferring part of the runoff of the Kuban River to the Taman Gulf and creating a freshwater buffer zone in the southern part of the Kerch Strait. Possible effects of this action are analyzed. Author

N75-27463 Joint Publications Research Service, Arlington, Va.
PROCEDURE FOR EVALUATING TRENDS IN RIVER RUNOFF **c43**
P. P. Denisov *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 128-132 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 101-104 (For availability see N75-27450 18-42)

To perform water management calculations, data are needed on the forthcoming runoff regime of the investigated river in the investigated section. Some of the representations of this are based on the existing observations of the past period. On the basis of these generalized characteristics and the methods of mathematical simulation, it is possible to compile a representation of the future course of the runoff. During simulation by harmonic analysis methods, generalized characteristics of the runoff can be its mean magnitude and the amplitudes of all of the component harmonics. For simulation by means of a number of random numbers, the generalized characteristics are the mean magnitude of the series, the distribution law of the investigated values, and all the parameters of this distribution. Author

N75-27464 Joint Publications Research Service, Arlington, Va.
ACCURACY OF MEASURING LONGWAVE RADIATION BY THE ACTINOMETRIC RADIOSONDE **c46**
G. N. Kostyanoy *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 133-140 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 105-109 (For availability see N75-27450 18-42)

A study is made of the method of analyzing the absolute

errors of an actinometric radiosonde. Error values are presented and discussed. Author

N75-27465 Joint Publications Research Service, Arlington, Va.
DETERMINATION OF THE SURFACE LAYER TEMPERATURE OF THE BERING SEA ACCORDING TO THE AERIAL THERMAL SURVEY DATA **c48**
G. V. Girdyuk, G. G. Zykova, and F. S. Terziyev *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 141-147 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 109-112 (For availability see N75-27450 18-42)

On the basis of the experimental data, corrections were obtained which take into account the effect of the intermediate layer of the atmosphere on the readings of the infrared radiometer, and the deviation of the surface temperature from the surface layer temperature. For operative aerial thermal surveys of the Bering Sea, a model of the LOGOIN-LITMO aircraft radiometer was used which permits determination of the temperature of the surface of the sea by measuring the infrared radiation of the water surface. When measuring the water temperature by a radiometer from an aircraft, a filter was used which transmits the longwave radiation in the wavelength range from 8 to 13 microns (in which the atmosphere has the least effect on the radiation flux). Author

N75-27466# World Meteorological Organization, Geneva (Switzerland).
PRELIMINARY SCIENTIFIC RESULTS OF THE GARP ATLANTIC TROPICAL EXPERIMENT, VOLUME 1
Jan. 1975 386 p refs Prepared jointly with Intern. Council of Sci. Unions
(GATE-14) Avail: NTIS HC $10.25; WMO, Geneva

During the period 15 June to 23 September 1974 the GARP Atlantic Tropical Experiment GATE was carried out in the predetermined area extending across the tropical zones of Africa, the Atlantic Ocean, and South and Central America. Studies are presented under the following headings: synoptic; convection; boundary layer; radiation; and oceanography. For individual titles, see N75-27467 through N75-27509.

N75-27467 Virginia Univ., Charlottesville.
IMPLICATIONS FROM THE GATE DROPWINDSONDE PROGRAM REGARDING A-SCALE CIRCULATIONS **c47**
R. H. Simpson and Joanne Simpson *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 1-11 refs (For availability see N75-27466 18-42)

The operational procedures for dropwindsonde from WC-135 type aircraft during the GARP Atlantic Tropical experiment are described. The implications concerning synoptic circulation in tropical regions from dropwindsonde reconnaissance are discussed. ESRO

N75-27468 Hydrometeorological Scientific Research Center (USSR).
ON THE EVOLUTION OF INTERTROPICAL CONVERGENCE ZONE **c47**
M. A. Petrosiants, A. I. Snitkovsky, and A. I. Falkovich *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 12-28 refs (For availability see N75-27466 18-42)

The correlation between the cold outbreaks of middle latitudes and the intensification of intertropical convergence zone (ITCZ) are discussed, and a hypothesis based on the interaction of the cold outbreak and the ITCZ is suggested. Various aspects of a strong and depressed ITCZ in the troposphere are discussed: these include vertical velocity, vertical mass flows, and horizontal air mass divergence. ESRO

N75-27469 Hydrometeorological Scientific Research Center (USSR).
COMPARISON OF BALANCE CHARACTERISTICS FOR STRONG AND DEPRESSED INTERTROPICAL CONVERGENCE ZONES **c47**
A. I. Falkovich and V. A. Antsipovich *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 29-50 refs (For availability see N75-27466 18-42)

Using the most informative factors and cloud data, the change of atmospheric processes at the transition from clear sky to a strong and depressed intertropical convergence zone (ITCZ) is studied. Latent heat, sensible heat and total energy influxes due to large-scale motions into a unit atmospheric column are discussed together with the energy balance of the column. ESRO

N75-27470 GATE Operational Control Centre, Dakar (Senegal).
WIND INTERCOMPARISON AFTER PHASE 2 OF GATE **c47**
D. Mussa (East African Meteorol. Dept., Nairobi, Kenya) and J. Reiff (Roy. Neth. Meteorol. Inst., De Bilt) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 51-75 (For availability see N75-27466 18-42)

Comparisons are made of upper air wind velocity and direction measurements collected by ships releasing and following balloons during the second observing phase of the GARP Atlantic Tropical Experiment. Upper winds observed by radar, omega and VLF systems are compared up to 100 mb. ESRO

N75-27471 Academy of Sciences of the Ukrainian SSR, Sevastopol (USSR). Inst. of Hydrophysics.
SOME RESULTS OF THE ANALYSIS OF THE INTERCOMPARISON DATA OF THE METEOROLOGICAL COMPLEXES FROM THE SOVIET SHIPS **c47**
T. P. Svetlova *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 76-81 ref (For availability see N75-27466 18-42)

The wide range of observations taken by Soviet ships during the GARP Atlantic Tropical Experiment made it necessary to have a qualitative estimation as to the accuracy of measurements in accordance with WMO requirements. All measurements of meteorological parameters taken during the comparison period were analyzed. Results of the analyses are presented together with limitations of the comparison program. ESRO

N75-27472 GATE Operational Control Centre, Dakar (Senegal).
PRELIMINARY STUDY OF THE MOISTURE FIELD AT 23.5 DEG W IN THE VICINITY OF THE TRADE INVERSION **c47**
Sharon E. Nicholson *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 82-88 (For availability see N75-27466 18-42)

Meridional cross-sections of temperature-dew point depression at 23.5 deg W are presented for 18 days during phase 2 of the GARP Atlantic Tropical Experiment. The position of the trade monsoon was established by the moisture gradient. ESRO

N75-27473 Hydrometeorological Scientific Research Center (USSR).
THE AIR CIRCULATION IN THE TROPICAL TROPOSPHERE ALONG THE MERIDIAN OF 23 DEG 30 MIN W **c47**
M. A. Petrossiants, S. Slaby, A. I. Snitkovsky, and A. I. Falkovich *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 89-95 (For availability see N75-27466 18-42)

A representation is discussed of the fields of vertical, meridional and zonal atmospheric circulation along the meridian 23 deg 30 min. W in the developed and decayed intertropical convergence zone (ITCZ), that is the structure of air flows in the ITCZ are given when cloud clusters are present or absent. ESRO

N75-27474 GATE Operational Control Centre, Dakar (Senegal).
WEATHER FORECASTING FOR GATE **c47**
Robert W. Burpee (Natl. Hurricane Res. Lab., Miami, Fla.) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 96-100 (For availability see N75-27466 18-42)

The background and purpose of weather forecasting for GATE is briefly described. Weather disturbances affecting the B-scale array are noted and weather forecasting techniques are discussed. ESRO

N75-27475 Arkticheskii i Antarkticheskii Nauchno-Issledovatelskii Inst., Leningrad (USSR).
ON THE TEMPORAL STRUCTURE OF THE FIELDS OF METEOROLOGICAL ELEMENTS IN THE TROPICAL FREE ATMOSPHERE **c47**
I. I. Tsigilnitsky *In* WMO Prelim. Sci. Results of the GARP

Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 101-110 refs (For availability see N75-27466 18-42)

The temporal variability of the air pressure, geopotential, temperature, relative humidity and wind speed in the free atmosphere of the tropical zone is described. Preliminary assessment of the agreement between the empirical distribution of the parameters to the normal distribution law is also given. ESRO

N75-27476 World Meteorological Organization, Geneva (Switzerland).
THE 150-MILLIBAR WINDS FROM GATE EQUATORIAL SHIPS c47
David E. Parker *In its* Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 111-128 refs (For availability see N75-27466 18-42)

Unvalidated 150-millibar winds were extracted for three GATE equatorial ships. It is concluded that zonal winds in the upper troposphere undergo slow changes in the time scale of weeks, whereas meridional winds often experience 4-day periodicities. ESRO

N75-27477 GATE Operational Control Centre, Dakar (Senegal).
SEA-SURFACE TEMPERATURE VARIATION OFF THE WEST COAST OF AFRICA DURING PHASE 1 OF GATE c48
Sharon E. Nicholson *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 129-136 (For availability see N75-27466 18-42)

An analysis is made of sea surface temperature for July 1974 off the west coast of Africa. General features of the temperature pattern are presented, and the temperature variation discussed. The variation of convection activity and its relationship with sea-surface temperature variation is also noted. It is concluded that persistent cloud cover can reduce sea-surface temperature. ERSO

N75-27478 GATE Operational Control Centre, Dakar (Senegal).
VERTICAL MOTION AND VORTICITY IN THE A/B-SCALE AREA, PHASE 2 c67
Wayne H. Schubert (Colorado State Univ., Fort Collins) and Richard J. Reed (Washington Univ., Seattle) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 137-144 ref (For availability see N75-27466 18-42)

The results of vertical velocity and vorticity computation carried out a triangle of stations in the GATE A/B-scale network are reported. Average profiles are given. ESRO

N75-27479 GATE Operational Control Centre, Dakar (Senegal).
COMPOSITE MASS BUDGETS FOR THE INNER HEXAGON OF THE EAST ATLANTIC SHIP ARRAY c47
David R. Rodenhuis (Maryland Univ., College Park) and Hyo-Duck Chang (Maryland Univ., College Park) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 145-158 Sponsored in part by Univ. Corp. for Atmospheric Res. (For availability see N75-27466 18-42)
(Grant NSF GA-32778)

The feasibility of using the smaller triangular areas of the B-scale ship array (inner hexagon) to compute composite mass budgets is investigated. A comparison is also made between the results from smaller and larger volumes within the B-arrays. ESRO

N75-27480 Central Aerological Observatory, Moscow (USSR).
PRELIMINARY RESULTS OF COMPARISON OF SMALL-SCALE WIND AND TEMPERATURE FIELDS IN THE TROPICAL ZONE OF THE ATLANTIC AND IN MIDDLE LATITUDES c47
V. P. Beliaev, V. K. Dmitriev, V. F. Makarov, and G. N. Shur *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 159-168 (For availability see N75-27466 18-42)

A comparison in made between spectral measurements of the temperature and wind fields over the tropical Atlantic and over land in middle latitudes. The results are discussed. ESRO

N75-27481 GATE Operational Control Centre, Dakar (Senegal).
VARIATION OF THE INTER-TROPICAL CONVERGENCE ZONE DURING PHASES 1, 2, AND 3 OF THE GATE EXPERIMENT c47
Sharon E. Nicholson *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 169-175 (For availability see N75-27466 18-42)

The position of the ITCZ was subjectively determined from infrared satellite photographs and was defined as the band of maximum cloudiness in the tropical Atlantic. Generalizations are made regarding the variations of the ITCZ. ESRO

N75-27482 GATE Operational Control Centre, Dakar (Senegal).
A SATELLITE CONVECTIVE CODE c47
David W. Martin (Wisconsin Univ., Madison) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 176-181 refs (For availability see N75-27466 18-42)
(Grant NSF GA-40494)

A satellite convective code, developed as an objective means of evaluating the depth and intensity of convection in pictures from the Synchronous Meteorological Satellite, is discussed and related to a ship convective code. ESRO

N75-27483 GATE Operational Control Centre, Dakar (Senegal).
CHARACTERISTICS OF WEST AFRICAN AND ATLANTIC CLOUD CLUSTERS c47
David W. Martin (Wisconsin Univ., Madison) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 182-190 (For availability see N75-27466 18-42)
(Grant NSF GA-40494)

A summary of cloud cluster characteristics over West Africa and the Atlantic Ocean is presented based on several time dependent statistics such as position, size, convective intensity etc. Trajectories, lifetime and diurnal variation are discussed. ESRO

N75-27484 GATE Operational Control Centre, Dakar (Senegal).
STUDY OF DIURNAL VARIATIONS IN CONVECTION USING QUADRA RADAR, PHASES 1 AND 2 c47
Frank Marks *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 191-204 (For availability see N75-27466 18-42)

A quantitative study is made to assess the existence of any diurnal variations in convection as seen by radar. Four parameters were chosen to represent the different characteristics of the radar-observed convection. The parameters are described and the results discussed. ESRO

N75-27485 Central Aerological Observatory, Moscow (USSR).
ON THE MORPHOLOGY OF CLOUDS OF THE EASTERN ZONE OF TROPICAL ATLANTIC c47
A. M. Borovikov, Y. V. Lavrentiev, and I. P. Mazin *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 205-206 refs (For availability see N75-27466 18-42)

For GATE region, clouds are divided into four groups differing by morphological features - low level clouds, middle level clouds, high level clouds, and convection clouds. The characteristics of each group are described. ESRO

N75-27486 Central Aerological Observatory, Moscow (USSR).
ON THE MICROSTRUCTURE OF HIGH CLOUDS BY OBSERVATIONS MADE DURING GATE 74 c47
A. N. Nevzorov and V. F. Shugaev *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 207-210 ref (For availability see N75-27466 18-42)

The characteristics and microstructure of high clouds which affect the atmospheric processes in the GATE region are described and discussed. ESRO

N75-27487 GATE Operational Control Centre, Dakar (Senegal).
AIRCRAFT OBSERVATIONS OF ITCZ STRUCTURE ON 4 AUGUST 1974 c47
Richard J. Reed (Washington Univ., Seattle), Noel E. LaSeur (Florida State Univ.), and David Berrill (London Univ.) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 211-216 (For availability see N75-27466 18-42)

The characteristics, especially wind and temperature variations, of a moderately active ITCZ as observed by aircraft are described. ESRO

N75-27488 GATE Operational Control Centre, Dakar (Senegal).
AN EXAMPLE OF A SQUALL LINE IN THE B-SCALE NETWORK c47
Richard J. Reed (Washington Univ., Seattle) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 217-222 (For availability see N75-27466 18-42)

The phenomenon encountered by aircraft flying in a well developed cloud cluster during GATE is described. Abrupt wind shifts, followed by brief showers and moderate turbulence were observed. It is concluded that the phenomenon appears similar to squall lines observed in the U.S.A. and elsewhere. ESRO

N75-27489 Mainz Univ. (West Germany). Inst. fuer Meteorologie.
TURBULENT FLUXES IN THE ITCZ DURING GATE PHASE 3 AT STATION 27 c47
J. Mueller-Glewe and H. Hinzpeter *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 224-232 refs Sponsored by Deut. Forschungsgemeinschaft (For availability see N75-27466 18-42)

Preliminary results are presented and discussed of turbulent flux measurements obtained during GATE phase 3 from on board WFS Planet. The instrumentation is described. ESRO

N75-27490 Hydrometeorological Service of the USSR.
THE RESULTS OF THE DIRECT MEASUREMENTS OF TURBULENT CHARACTERISTICS FOR PLANETARY BOUNDARY LAYER c47
V. D. Andreev, V. N. Ivanov, V. C. Korolev, V. M. Linkin, T. F. Masagutov, A. V. Smirnov, and Y. Holtz *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 233-244 refs Prepared jointly with Acad. of Sci., Moscow (For availability see N75-27466 18-42)

Measurements by means of balloons of the vertical structure and the time variations of the planetary boundary layer including the variations of turbulent characteristics are described. The experimental results which are presented in the form of charts are discussed. ESRO

N75-27491 World Meteorological Organization, Geneva (Switzerland).
VARIATIONS OF EVAPORATION IN THE B-SCALE AREA OF GATE c47
Heinrich Hoeber *In its* Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 245-251 (For availability see N75-27466 18-42)

The vertical flux of water vapor through the air-sea interface was computed using the bulk-aerodynamic formula. The data was taken from the daily transmitted routine surface observation of ship stations in the GATE areas. The results of the computation are presented in the form of time-latitude-cross sections. ESRO

N75-27492 National Oceanic and Atmospheric Administration, Washington, D.C. Center for Experiment Design and Data Analysis.
PRELIMINARY ESTIMATES OF TURBULENT ENERGY FLUXES IN THE WESTERN B-SCALE ARRAY c47
Peter L. Grose *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 252-259 ref (For availability see N75-27466 18-42)

Surface meteorological parameters were measured using an automated data collection system. Preliminary estimates of vertical energy fluxes computed from the near real time data set are presented. ESRO

N75-27493 Academy of Sciences (USSR), Moscow. Inst. of Atmospheric Physics.
CHARACTERISTICS OF THE TURBULENT EXCHANGE BETWEEN THE OCEAN AND ATMOSPHERE IN THE EQUATORIAL ATLANTIC c47
L. G. Elagina, B. M. Koprov, and Y. A. Volkov *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 260-266 refs (For availability see N75-27466 18-42)

Results of data measurements on the vertical turbulent transfer of heat, moisture and momentum obtained during the R/V Akademik Kurchatov participating in GATE are presented giving reliable estimates of fluxes and their variance. The results are discussed. ESRO

N75-27494 Academy of Sciences (USSR), Moscow.
THE INTERACTION BETWEEN THE SURFACE AND THE ATMOSPHERE AT THE EQUATOR c47
V. M. Radikevich and E. I. Serjakov *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 267-275 refs (For availability see N75-27466 18-42)

The parameterization of turbulent fluxes at the equator using standard meteorological observation data of weather ships is developed. A preliminary analysis of data obtained aboard the Academician Kurchatov is made and compared with that of Tropex-72. ESRO

N75-27495 National Center for Atmospheric Research, Boulder, Colo.
A STUDY OF THE SUBCLOUD LAYER IN THE VICINITY OF AN ISOLATED LINE OF CUMULUS c47
William T. Pennell *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 276-286 (For availability see N75-27466 18-42)

An airborne mission to study the structure of the boundary layer in relation to the line of convection in a small but persistent type of towering cumulus is described. Some of the data gathered is presented and the results are discussed. Lines for further work are suggested. ESRO

N75-27496 National Center for Atmospheric Research, Boulder, Colo.
PROFILES AND SPECTRA OF FAIR WEATHER TURBULENCE DATA FROM THE US L-188 AIRCRAFT DURING GATE c47
R. L. Grossman *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 287-293 refs (For availability see N75-27466 18-42)

Preliminary results of turbulence measurements are presented and compared to earlier results from the GATE area. Profiles and spectra of the three components of the wind, temperature fluctuation and water vapor fluctuations are given. ESRO

N75-27497 Main Geophysical Observatory, Leningrad (USSR).
VERTICAL PROFILES OF RADIATION FLUX DIVERGENCE IN TROPICAL ATMOSPHERE c47
V. F. Zhvalev, M. A. Prokofyev, and N. E. Ter-Markaryants *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 294-297 refs (For availability see N75-27466 18-42)

Vertical profiles of radiation heat divergence were obtained on the basis of aircraft measurement data during GATE. The dependence of divergence profile features on atmospheric conditions is analyzed and discussed. ESRO

N75-27498 Mainz Univ. (West Germany). Inst. fuer Meteorologie.
E-TYPE ABSORPTION IN THE TROPICS c47
Hartmut Grassl *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 298-303 refs (For availability see N75-27466 18-42)

A new type of atmospheric absorption depending on water vapor pressure e and found in the infrared window of the tropical atmosphere was studied by clear sky emission measurements with a 5-channel interference filter radiometer. Tables give values of the total optical depth and the total atmospheric water vapor amount up to 400 mb pressure. ESRO

N75-27499 Central Aerological Observatory, Moscow (USSR).
VERTICAL PROFILES OF THE LONG-WAVE RADIATION FLUXES ON THE GATE AREA c47
Nina A. Zaitseva *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 304-309 (For availability see N75-27466 18-42)

In order to study the vertical profiles of the long-wave radiation fluxes in the free atmospheric ten Soviet GATE ships carried out radiometer balloon sounding of the atmosphere during the GATE period. The measurements obtained are presented and discussed. ESRO

N75-27500 Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla. Div. of Physical Oceanography.

LONG, WESTWARD WAVES IN THE UPPER EQUATORIAL ATLANTIC c48
W. Dueing and R. Evans *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 310-319 refs (For availability see N75-27466 18-42)

During the second phase of GATE, a current profiling experiment was carried out in the equatorial Atlantic. Current and temperature profiles were taken in the vicinity of anchored buoys to a depth of 600 meters and lasting 2 and 1/2 hours per profile. A mean drift vector was computed. Results obtained by one of the ships (R/V Columbus Iselin (USA)) are presented and discussed in detail. ESRO

N75-27501 Academy of Sciences (USSR), Kaliningrad. Inst. of Oceanology.
ON VARIABILITY OF WATER TEMPERATURE IN THE EQUATORIAL ATLANTIC c48
V. A. Bubnov, K. V. Moroshkin, and V. D. Egorikhin *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 320-326 refs (For availability see N75-27466 18-42)

Preliminary results of investigations into the synoptic time variation of water temperature at the equator are presented based on data obtained over the first GATE-74 phase by R/V Akademik Kurchatov. It is concluded that the synoptic temperature changes in the equatorial thermocline are closely related with the spatial fluctuations of the Lomonosov undercurrent. ESRO

N75-27502 Academy of Sciences (USSR), Kaliningrad. Inst. of Oceanology.
NEW DATA ON WATER DYNAMICS IN THE EQUATORIAL ATLANTIC c48
V. A. Bubnov, V. D. Egorikhin, and K. V. Moroshkin *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 327-332 refs (For availability see N75-27466 18-42)

Measurements obtained during the 19th GATE cruise are of use in studying large-scale nonstationary phenomena at the equator. Ocean currents were measured every 30 minutes in autonomous buoy stations using BPV-2 recorders. The observations show that the general current structure in the meridional section were nearly the same during the first and second phases of GATE. ESRO

N75-27503 Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla. Div. of Physical Oceanography.
MEANDER MOTIONS IN THE EQUATORIAL ATLANTIC c48
O. B. Brown and K. Voigt (Inst. fuer Meereskunde, Rostock, East Ger.) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 333-337 (For availability see N75-27466 18-42)

As part of GATE, Phase 2, a combined profiling current meter (PCM) and hydrography program were performed. Velocity field results of the PCM program are reported together with general comments about the observations. ESRO

N75-27504 Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla. Div. of Physical Oceanography.
CURRENT PROFILING OBSERVATIONS BY THE RV CAPRICORNE c48
W. Dueing, P. Hisard (Office de la Rech. Sci. et Tech. Outre-Mer, Abidjan, Ivory Coast), and J. Low *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 338-340 (For availability see N75-27466 18-42)

As part of GATE, Phase 2, the R/V Capricorne (F) performed a combined profiling current meter (PCM) and hydrography program. First results of the PCM program and a discussion of these results in the context of similar observations from other ships are reported. ESRO

N75-27505 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
TIME-VARIATIONS OF THE UPPER EQUATORIAL CURRENT SYSTEM IN THE ATLANTIC OCEAN (PRELIMINARY RESULTS) c48
Jens Meincke *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 341-344 ref (For availability see N75-27466 18-42)

A brief description of preliminary results from current measurements in the equatorial Atlantic during Phase 2 of GATE is presented. Mean hourly values and variances for current meter records are given and discussed. ESRO

N75-27506 Centre de Recherches Oceanographiques, Abidjan (Ivory Coast).
A PRELIMINARY REPORT OF THE GATE PHASE 2 CRUISE OF THE RV CAPRICORNE c48
P. Hisard, J. Citeau, A. Morliere, J.-M. Verstraete, and B. Voituriez *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 345-349 (For availability see N75-27466 18-42)

Results of transequatorial cruises of the R/V Capricorne (F) during the second phase of GATE are briefly presented. Hydrological structures are described and data on prevailing winds, salinity, surface temperature etc., are given. ESRO

N75-27507 State Oceanographic Inst., Moscow (USSR).
PRELIMINARY ANALYSIS OF THE MATERIALS OF CURRENTS MEASUREMENTS AT THE EQUATOR DURING THE GATE EXPEDITION c48
A. A. Ribnikov *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 350-353 ref (For availability see N75-27466 18-42)

Data collected by the research weather ship Pascat in the equatorial Atlantic was used to analyse the currents in the GATE area. A preliminary analysis of the data is given and conclusions about the current flow and core are made. ESRO

N75-27508 Academy of Sciences of the Ukrainian SSR, Sevastopol (USSR). Inst. of Hydrophysics.
HORIZONTAL EDDY HEAT, DENSITY AND MOMENTUM TRANSPORTS IN THE LOMONOSOV CURRENT c48
A. P. Mirabel and V. M. Vasilenko *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 354-358 refs (For availability see N75-27466 18-42)

In the first phase of GATE-74 the R/V Akademik Kurchatov carried out an 18 day hydrological survey with observations made every 3 hours in the upper 1000 m layer of the ocean. The data obtained enabled the calculation of the large-scale horizontal turbulent mass, heat and momentum fluxes in the Lomonosov current. ESRO

N75-27509 Academy of Sciences of the Ukrainian SSR, Sevastopol (USSR). Inst. of Hydrophysics.
ABOUT ORTHOGONAL PATTERN FUNCTIONS OF THE VERTICAL STRUCTURE OF LOMONOSOV CURRENT c48
A. P. Mirabel and V. M. Vasilenko *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 359-364 refs (For availability see N75-27466 18-42)

Results of data obtained concerning the vertical structure of current velocity, temperature, and density of water in the Lomonosov current during the first and second GATE-74 phases are discussed using the method of orthogonal pattern functions. ESRO

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N75-27510 British Library Lending Div., Boston Spa (England).
TAIMYR: TREASURE PENINSULA
[1974] 3 p Transl. into ENGLISH from Izvestia (USSR), 28 May 1974
(BLL-M-23521-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

The geological structure of the Taimyr Peninsula is discussed with emphasis on the mineral and energy resources. F.O.S.

N75-27511 British Library Lending Div., Boston Spa (England).
THE INFLUENCE OF THE PETROLOGY OF THE KARAGANDIN COALS ON THEIR METHANE CONTENTS
M. A. Ermekov, G. N. Krikunov, and E. Sh. Ortenberg [1974] 8 p refs Transl. into ENGLISH from Khim. Tverd. Topl. (Moscow), no. 3, 1973 p 119-123
(BLL-RTS-9309) Avail: British Library Lending Div., Boston Spa, Engl.: £1.60; 3 BLL photocopy coupons

The results of an investigation of the influence of the petrological composition on the methane sorption capacity of coals of the Karagandin field are presented with the object of obtaining reliable initial data for forecasting the methane output of mines. On the basis of investigations, an empirical relationship of the methane content to the microcomponents of the fusinite group is developed and the meaning of this relationship is explained. Author

N75-27512 Texas A&M Univ., College Station.
ANALYTICAL AND PETROFABRIC STUDIES OF EXPERIMENTAL FAULTED DRAPE FOLDS IN LAYERED ROCK SPECIMENS Ph.D. Thesis
Kyung Duck Min 1974 100 p
Avail: Univ. Microfilms Order No. 75-15050

Faulted drap-folds are produced experimentally by forcing a block of brittle sandstone along a lubricated saw cut into three sedimentary layers of Indiana Limestone, Coconino Sandstone, and Indiana Limestone. Internal stress distributions and patterns of faults in the deformed sedimentary layers are mapped by (1) petrofabric observations of the locations and orientations of reverse and normal faults, microfractures, and compression and extension axes inferred from orientations of calcite twin lamellae, and (2) analytical solutions of principal-stress trajectories by means of Airy's stress function and predictions of potential faults by means of the Mohr-Coulomb failure criterion. Boundary conditions for the numerical models are similar to those of the experiments. Petrofabric observations and the solutions of two-dimensional elastic analyses show that the orientations of principal stresses up to the onset of failure depend only upon the size of the layer and Poisson's ratio. Dissert. Abstr.

N75-27513 Michigan State Univ., East Lansing.
A MODEL FOR SURFACE AREA, MINERALOGY, AND METAMORPHIC GRADE IN CARBONATES Ph.D. Thesis
Gary Ray Byerly 1974 29 p
Avail: Univ. Microfilms Order No. 75-14709

Highly significant variation is demonstrated as a function of both metamorphic grade and percentage of coexisting phases by total and partitioned components of surface area in metacarbonates ranging from greenschist to middle amphibolite grade. Total surface area is considered a positive linear function of modal percent second phases, whereas, calcite-calcite surface area is considered a negative linear function at greenschist grade and a very flat second order function at amphibolite grades. Surface area components are shown to decrease with increasing metamorphic grade. The surface area of second phases is controlled by inhibiting grain boundary migration and thus grain growth. At low grades, strain induced recrystallization and grain boundary migration result in a high surface area aggregate. At higher grades, grain boundary migration, driven by surface energy differences, becomes dominant and results in a very low surface area aggregate. Dissert. Abstr.

N75-27514*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
KANSAS ENVIRONMENTAL AND RESOURCE STUDY: A GREAT PLAINS MODEL Final Report, 1 Aug. 1972 - 17 Mar. 1974
Robert M. Haralick, Principal Investigator 12 Feb. 1975 32 p ERTS
(Contract NAS5-21822)
(E75-10326; NASA-CR-143063) Avail: NTIS HC $3.75 CSCL 08F

There are no author-identified significant results in this report.

N75-27515*# Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.
DETERMINE UTILITY OF ERTS-1 TO DETECT AND MONITOR AREA STRIP MINING AND RECLAMATION Final Report, Aug. 1972 - Feb. 1975
Robert H. Rogers, Principal Investigator and Wayne A. Pettyjohn (Ohio State Univ.) Feb. 1975 62 p refs Original contains color illustrations. Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21762)
(E75-10327; NASA-CR-143064; BSR-4179) Avail: NTIS HC $4.25 CSCL 08I

The author has identified the following significant results. Computer techniques were applied to process ERTS tapes acquired over coal mining operations in southeastern Ohio on 21 August 1972 and 3 September 1973. ERTS products obtained included geometrically correct map overlays showing stripped earth, partially reclaimed earth, water, and natural vegetation. Computer-generated tables listing the area covered by each land-water category in square kilometers and acres were produced. By comparing these mapping products, the study demonstrates the capability of ERTS to monitor changes in the extent of stripping, success of reclamation, and the secondary effects of mining on the environment.

N75-27516*# Pennsylvania State Univ., University Park. Office for Remote Sensing of Earth Resources.
INTERDISCIPLINARY APPLICATION AND INTERPRETATION OF EREP DATA WITHIN THE SUSQUEHANNA RIVER BASIN Quarterly Progress Report, Dec. 1974 - Feb. 1975
George J. McMurtry and Gary W. Petersen, Principal Investigators Mar. 1975 16 p EREP
(Contract NAS9-13406)
(E75-10328; NASA-CR-143065) Avail: NTIS HC $3.25 CSCL 08H

The author has identified the following significant results. It has become that lineaments seen on Skylab and ERTS images are not equally well defined, and that the clarity of definition of a particular lineament is recorded somewhat differently by different interpreters. In an effort to determine the extent of these variations, a semi-quantitative classification scheme was devised. In the field, along the crest of Bald Eagle Mountain in central Pennsylvania, statistical techniques borrowed from sedimentary petrography (point counting) were used to determine the existence and location of intensely fractured float rock. Verification of Skylab and ERTS detected lineaments on aerial photography at different scales indicated that the brecciated zones appear to occur at one margin of the 1 km zone of brecciation defined as a lineament. In the Lock Haven area, comparison of the film types from the SL4 S190A sensor revealed the black and white Pan X photography to be superior in quality for general interpretation to the black and white IR film. Also, the color positive film is better for interpretation than the color IR film.

N75-27517*# Pennsylvania State Univ., University Park. Office of Remote Sensing of Earth Resources.
PRELIMINARY SKYLAB MSS CHANNEL EVALUATION Interim Report
George J. McMurtry, Gary W. Petersen, Principal Investigators, D. M. Barr, and F. Y. Borden Jun. 1975 4 p EREP
(Contract NAS9-13406)
(E75-10329; NASA-CR-143066; ORSER-SSEL-TR-2-75) Avail: NTIS HC $3.25 CSCL 05B

The author has identified the following significant results. A set of 18 channels which were considered of usable quality were identified. These were channels 1-14, 17, 19-21. Channels 15, 16, 18, and 22 were dropped out because they were of poor quality; channels 7 and 11 were dropped to limit the total channel number to 16. From these 16 channels, a total of 22 signatures were obtained. Eight were developed from uniform blocks of the UMAP, and 14 from use of the DCLUS program. These signatures fell into six basic categories and classified more than 90% of the five scenes mapped: agriculture land (6 signatures); forest aland (4); water (2); open nonagriculture land (2); urban (6); and disturbed land (2).

N75-27518*# North Carolina State Univ., Raleigh. Dept. of Geosciences.
UTILIZATION OF EREP DATA IN GEOLOGICAL EVALUATION, REGIONAL PLANNING, FOREST MANAGEMENT,

AND WATER MANAGEMENT IN NORTH CAROLINA Quarterly Progress Report, Mar. - May 1975
Charles W. Welby, Principal Investigator 6 Jun. 1975 2 p EREP
(Contract NAS9-13321)
(E75-10330; NASA-CR-143067) Avail: NTIS HC $3.25 CSCL 05B

The author has identified the following significant results. Skylab imagery was evaluated, compiling vegetational and land use information in conjunction with a potential state park site fin along the Eno River in Durham County. Preliminary evaluation indicates that accuracy of identification was at the 90% level. Attempts at distinguishing between rock types in the Piedmont have proved generally unsuccessful, and recognition of linear features seems the best geologic use which the imagery can be put. The study concentrated on the High Rock Lake area of Davidson County. A study evaluating Skylab photographs for land use mapping in urban and rural areas of Piedmont North Carolina shows that S190A and S190B as well as U-2 imagery have almost the same accuracy when the interpretations are assessed with the square grid sampling method, even though the S190B imagery basically has a greater resolution.

N75-27519*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
APPLICATION OF ERTS IMAGES AND IMAGE PROCESSING TO REGIONAL GEOLOGIC PROBLEMS AND GEOLOGIC MAPPING IN NORTHERN ARIZONA
A. F. H. Goetz, Principal Investigator, F. C. Billingsley, A. R. Gillespie, M. J. Abrams, R. L. Squires, E. M. Shoemaker (Calif. Inst. of Tech.), I. Lucchitta (Geol. Survey, Flagstaff, Ariz.), and D. P. Elston (Geol. Survey, Flagstaff, Ariz.) 15 May 1975 203 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS7-100)
(E75-10331; NASA-CR-143068; JPL-TR-32-1597) Avail: NTIS HC $7.25 CSCL 08B

The author has identified the following significant results. Computer image processing was shown to be both valuable and necessary in the extraction of the proper subset of the 200 million bits of information in an ERTS image to be applied to a specific problem. Spectral reflectivity information obtained from the four MSS bands can be correlated with in situ spectral reflectance measurements after path radiance effects have been removed and a proper normalization has been made. A detailed map of the major fault systems in a 90,000 sq km area in northern Arizona was compiled from high altitude photographs and pre-existing published and unpublished map data. With the use of ERTS images, three major fault systems, the Sinyala, Bright Angel, and Mesa Butte, were identified and their full extent measured. A byproduct of the regional studies was the identification of possible sources of shallow ground water, a scarce commodity in these regions.

N75-27520*# Geological Survey, Bay Saint Louis, Miss. National Space Technology Labs.
HYDROLOGIC SIGNIFICANCE OF LINEAMENTS IN CENTRAL TENNESSEE Quarterly Progress Report, 1 Dec. 1974 - 28 Feb. 1975
Gerald K. Moore and Este F. Hollyday, Principal Investigators 28 Feb. 1975 4 p EREP
(NASA Order H-2810-B)
(E75-10332; NASA-CR-143069) Avail: NTIS HC $3.25 CSCL 08H

There are no author-identified significant results in this report.

N75-27521*# Northern Prairie Wildlife Research Center, Jamestown, N. Dak.
UTILIZATION OF SKYLAB (EREP) SYSTEM FOR APPRAISING CHANGES IN CONTINENTAL MIGRATORY BIRD HABITAT Monthly Progress Report, May 1975
David S. Gilmer, Principal Investigator May 1975 2 p EREP (NASA Order T-4114-B; Contract DI-14-16-0008-802)
(E75-10333; NASA-CR-143070) Avail: NTIS HC $3.25 CSCL 06C

There are no author-identified significant results in this report.

N75-27522*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
A STUDY OF THE UTILIZATION OF ERTS-1 DATA FROM THE WABASH RIVER BASIN Final Report, 1 Jul. 1972 - 31 May 1974
David A. Landgrebe, Principal Investigator Oct. 1974 353 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21773)
(E75-10334; NASA-CR-143071; LARS-IN-052375) Avail: NTIS HC $10.00 CSCL 05B

The author has identified the following significant results. The identification and area estimation of crops experiment tested the usefulness of ERTS data for crop survey and produced results indicating that crop statistics could be obtained from ERTS imagery. Soil association mapping results showed that strong relationships exist between ERTS data derived maps and conventional soil maps. Urban land use analysis experiment results indicate potential for accurate gross land use mapping. Water resources mapping demonstrated the feasibility of mapping water bodies using ERTS imagery.

N75-27523*# Northern Prairie Wildlife Research Center, Jamestown, N. Dak.
UTILIZATION OF SKYLAB (EREP) SYSTEM FOR APPRAISING CHANGES IN CONTINENTAL MIGRATORY BIRD HABITAT Monthly Progress Report, Jun. 1975
David S. Gilmer, Principal Investigator Jun. 1975 2 p EREP (NASA Order T-4114-B; Contract DI-14-16-0008-802)
(E75-10335; NASA-CR-143072) Avail: NTIS HC $3.25 CSCL 06C

There are no author-identified significant results in this report.

N75-27524*# National Marine Fisheries Service, Bay Saint Louis, Miss.
APPLICATION OF REMOTE SENSING FOR FISHERY RESOURCE ASSESSMENT AND MONITORING Progress Report, 1 May - 31 May 1975
K. J. Savastano, Principal Investigator 31 May 1975 3 p EREP
(NASA Order T-8217-B)
(E75-10336; NASA-CR-143073; PR-17) Avail: NTIS HC $3.25 CSCL 08A

There are no author-identified significant results in this report.

N75-27525*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
IMAGE ENHANCEMENT AND ADVANCED INFORMATION EXTRACTION TECHNIQUES FOR ERTS-1 DATA Final Report, 12 Jun. 1972 - 31 Oct. 1974
William A. Malila, Principal Investigator, Richard F. Nalepka, and Jane E. Sarno Jun. 1975 141 p refs ERTS
(Contract NAS5-21783)
(E75-10337; NASA-CR-143074; ERIM-193300-66-F) Avail: NTIS HC $5.75 CSCL 05B

The author has identified the following significant results. It was demonstrated and concluded that: (1) the atmosphere has significant effects on ERTS MSS data which can seriously degrade recognition performance; (2) the application of selected signature extension techniques serve to reduce the deleterious effects of both the atmosphere and changing ground conditions on recognition performance; and (3) a proportion estimation algorithm for overcoming problems in acreage estimation accuracy resulting from the coarse spatial resolution of the ERTS MSS, was able to significantly improve acreage estimation accuracy over that achievable by conventional techniques, especially for high contrast targets such as lakes and ponds.

N75-27526*# Environmental Research Inst. of Michigan, Ann Arbor.
STUDY OF RECREATIONAL LAND AND OPEN SPACE USING SKYLAB IMAGERY Monthly Progress Report, May 1975
Irvin J. Sattinger, Principal Investigator 11 Jun. 1975 9 p EREP

(Contract NAS9-13283)
(E75-10338; NASA-CR-143078; ERIM-103300-51-L) Avail: NTIS HC $3.25 CSCL 08B

The author has identified the following significant results. An analysis of the statistical uniqueness of each of the signatures of the Gratiot-Saginaw State Game Area was made by computing a matrix of probabilities of misclassification for all possible signature pairs. Within each data set, the 35 signatures were then aggregated into a smaller set of composite signatures by combining groups of signatures having high probabilities of misclassification. Computer separation of forest denisty classes was poor with multispectral scanner data collected on 5 August 1973. Signatures from the scanner data were further analyzed to determine the ranking of spectral channels for computer separation of the scene classes. Probabilities of misclassification were computed for composite signatures using four separate combinations of data source and channel selection.

N75-27527*# Environmental Research Inst. of Michigan, Ann Arbor. Information Systems and Analysis.
DEVELOPING PROCESSING TECHNIQUES FOR SKYLAB DATA Monthly Progress Report, May 1975
Richard F. Nalepka, Principal Investigator, William A. Malila, and James P. Morgenstern 12 Jun. 1975 11 p EREP
(Contract NAS9-13280)
(E75-10339; NASA-CR-143075; ERIM-101900-57-L) Avail: NTIS HC $3.25 CSCL 05B

The author has identified the following significant results. The effects of misregistration and the scan-line-straightening algorithm on multispectral data were found to be: (1) there is greatly increased misregistration in scan-line-straightening data over conic data; (2) scanner caused misregistration between any pairs of channels may not be corrected for in scan-line-straightened data; and (3) this data will have few pure field center pixels than will conic data. A program SIMSIG was developed implementing the signature simulation model. Data processing stages of the experiment were carried out, and an analysis was made of the effects of spatial misregistration on field center classification accuracy. Fifteen signatures originally used for classifying the data were analyzed, showing the following breakdown: corn (4 signatures), trees (2), brush (1), grasses, weeds, etc. (5), bare soil (1), soybeans (1), and alfalfa (1).

N75-27528*# California Earth Science Corp., Santa Monica.
FAULT TECTONICS AND EARTHQUAKE HAZARDS IN THE PENINSULAR RANGES, SOUTHERN CALIFORNIA Monthly Progress Report, Jun. 1975
Paul M. Merifield, Principal Investigator 5 Jul. 1975 2 p EREP
(Contract NAS2-7698)
(E75-10340; NASA-CR-143076; MPR-25) Avail: NTIS HC $3.25 CSCL 05B

There are no author-identified significant results in this report.

N75-27529*# North Carolina State Univ., Raleigh. Dept. of Geosciences.
VEGETATIONAL ANALYSIS WITH SKYLAB-3 IMAGERY
Charles W. Welby, Principal Investigator and Robert E. Holman [1975] 27 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-13321)
(E75-10341; NASA-CR-143077) Avail: NTIS HC $3.75 CSCL 08F

The author has identified the following significant results. Color infrared photography from Skylab 3 appeared to be superior to ERTS imagery in a vegetational study of northeastern North Carolina. An accuracy of 87% was achieved in delimiting species composition and zonation patterns of three coastal, vegetation classes. A vegetation map of Perquimans County, North Carolina, seemed to have a high degree of correlation with information provided by high altitude U-2 photography. Random verification sites revealed an overall interpretation accuracy above 84%. Comparison of maps drawn utilizing Skylab photography with North Carolina Dept. of Agriculture estimates of crop acreage revealed some marked discrepancies. The chief difference lies in the nonagricultural category in which there is a 30% discrepancy. This fact raised some questions as to the definition of nonagricultural land uses and methods used by the State Dept. of Agriculture to determine actual percentages of crops grown.

N75-27530*# Army Construction Engineering Research Lab., Champaign, Ill.
EFFECTS OF CONSTRUCTION AND STAGED FILLING OF RESERVOIRS ON THE ENVIRONMENT AND ECOLOGY Progress Report, 1 Apr. - 30 Jun. 1975
Ravinder K. Jain, Principal Investigator 7 Jul. 1975 3 p ERTS
(NASA Order S-70255-AG)
(E75-10342; NASA-CR-143079) Avail: NTIS HC $3.25 CSCL 08H

There are no author-identified significant results in this report.

N75-27531*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
AN INTERDISCIPLINARY ANALYSIS OF MULTISPECTRAL SATELLITE DATA FOR SELECTED COVER TYPES IN THE COLORADO MOUNTAINS, USING AUTOMATIC DATA PROCESSING TECHNIQUES Monthly Progress Report, Jun. 1975
Roger M. Hoffer, Principal Investigator Jun. 1975 6 p EREP
(Contract NAS9-13380)
(E75-10343; NASA-CR-143080) Avail: NTIS HC $3.25 CSCL 08F

There are no author-identified significant results in this report.

N75-27532# Energy Resources Conservation Board, Calgary (Alberta).
CONSERVATION IN ALBERTA, 1973
1973 21 p
HC $3.25

A broad overview of the Energy Resources Conservation Board's activities is given. The following areas are emphasized: the impact of higher gas prices on the physical recovery of natural gas in Alberta, and an outline of available computer facilities including a brief history, current equipment, and its main uses. Author

N75-27533*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
MULTISPECTRAL PROCESSING BASED ON GROUPS OF RESOLUTION ELEMENTS Final Report, 15 May 1974 - 14 Mar. 1975
Wyman Richardson and James M. Gleason May 1975 120 p refs
(Contract NAS9-14123)
(NASA-CR-141895; ERIM-109600-18-F) Avail: NTIS HC $5.25 CSCL 08B

Several nine-point rules are defined and compared with previously studied rules. One of the rules performed well in boundary areas, but with reduced efficiency in field interiors; another combined best performance on field interiors with good sensitivity to boundary detail. The basic threshold gradient and some modifications were investigated as a means of boundary point detection. The hypothesis testing methods of closed-boundary formation were also tested and evaluated. An analysis of the boundary detection problem was initiated, employing statistical signal detection and parameter estimation techniques to analyze various formulations of the problem. These formulations permit the atmospheric and sensor system effects on the data to be thoroughly analyzed. Various boundary features and necessary assumptions can also be investigated in this manner. Author

N75-27534*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
STUDIES OF RECOGNITION WITH MULTITEMPORAL REMOTE SENSOR DATA Final Technical Report, 15 May 1974 - 14 Mar. 1975
William A. Malila, Ross H. Hieber, and Richard C. Cicone May 1975 99 p refs
(Contract NAS9-14123)
(NASA-CR-141896; ERIM-109600-19-F) Avail: NTIS HC $4.75 CSCL 08B

Characteristics of multitemporal data and their use in recognition processing were investigated. Principal emphasis was on satellite data collected by the LANDSAT multispectral scanner and on temporal changes throughout a growing season. The effects of spatial misregistration on recognition performance with multitemporal data were examined. A capability to compute probabilities of detection and false alarm was developed and used with simulated distributions for misregistered pixels. Wheat detection was found to be degraded and false alarms increased by misregistration effects. Multitemporal signature characteristics and multitemporal recognition processing were studied to gain insights into problems associated with this approach and possible improvements. Recognition performance with one multitemporal data set displayed marked improvements over results from single-time data. Author

N75-27535*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT: NON-US STANDARD CATALOG NO. N-33
31 May 1975 140 p
(NASA-TM-X-72439) Avail: NTIS HC $5.75 CSCL 05B

A catalog used for dissemination of information regarding the availability of LANDSAT imagery is presented. The Image Processing Facility of the Goddard Space Flight Center, publishes a U.S. and a Non-U.S. Standard Catalog on a monthly schedule, and the catalogs identify imagery which has been processed and input to the data files during the referenced month. The U.S. Standard Catalog includes imagery covering the continental United States, Alaska and Hawaii; the Non-U.S. Catalog identifies all the remaining coverage. Imagery adjacent to the continental U.S. and Alaska borders is included in the U.S. Standard Catalog. Author

N75-27536*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SKYLAB 4 PHOTGRAPHIC INDEX AND SCENE IDENTIFICATION
Richard W. Underwood and John W. Holland Jun. 1974 335 p
(NASA-TM-X-72440; JL12-603) Avail: NTIS HC $9.50 CSCL 08B

A quick reference guide to the photographic imagery obtained on Skylab 4 is presented. Place names and descriptors used give sufficient information to identify frames for discussion purposes and are not intended to be used for ground nadir or geographic coverage purposes. Author

N75-27537# Technische Hogeschool, Delft (Netherlands).
SOME INVESTIGATIONS ON THE CHEMICAL NATURE OF KEROGEN
Marcellinus Lambertus Jozef VanDenBerg 1975 106 p refs Avail: NTIS HC $5.25

The kerogens of Green River oil shale (GRS) and Messel oil shale were studied to help determine the nature of the organic matter and the type of chemical reactions important in kerogen formation. Low temperature (-78 C) ozonization was employed to obtain degradation fragments suitable for analysis. Since the kerogens exhibit enhanced reactivity in methylenechloride and methanol, these solvents were chosen for the experiments. The oxidation fragments of both kerogens show great similarity in carbon skeleton and functional groups. The degradation fragments of Messel include relatively more high molecular weight compounds and unsaturated structural elements than GRS. From the data obtained, the original contributing constituents are proposed to be relatively inert plant materials such as cuticles, waxes, and possibly sporopollenin. Possible explanations are presented for the above findings and the conclusions drawn from them. Author

N75-27538*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
PRELIMINARY DATA FOR THE 20 MAY 1974, SIMULTANEOUS EVALUATION OF REMOTE SENSORS EXPERIMENT
Robert W. Johnson, Carman E. Batten, David E. Bowker, Walter E. Bressette, and Gary W. Grew Jun. 1975 61 p
(NASA-TM-X-72676) Avail: NTIS HC $4.25 CSCL 14B

Several remote sensors were simultaneously used to collect data over the tidal James River from Hopewell to Norfolk, Virginia. Sensors evaluated included the Multichannel-Ocean Color Sensor, multispectral scanners, and multispectral photography. Ground truth measurements and remotely sensed data are given. Preliminary analysis indicates that suspended sediment and concentrated industrial effluent are observable from all sensors. Author

N75-27539*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT AND TEST OF VIDEO SYSTEMS FOR AIRBORNE SURVEILLANCE OF OIL SPILLS
John P. Millard, John C. Arvesen, and Patric L. Lewis Mar. 1975 25 p refs Prepared in cooperation with Coast Guard, Washington, D.C. Original contains color illustrations
(NASA-TM-X-62429; A-6047; CG-D-95-75) Avail: NTIS HC $3.25 CSCL 20F

Five video systems - potentially useful for airborne surveillance of oil spills - were developed, flight tested, and evaluated. The systems are: (1) conventional black and white TV, (2) conventional TV with false color, (3) differential TV, (4) prototype Lunar Surface TV, and (5) field sequential TV. Wavelength and polarization filtering were utilized in all systems. Greatly enhanced detection of oil spills, relative to that possible with the unaided eye, was achieved. The most practical video system is a conventional TV camera with silicon-diode-array image tube, filtered with a Corning 7-54 filter and a polarizer oriented with its principal axis in the horizontal direction. Best contrast between oil and water was achieved when winds and sea states were low. The minimum detectable oil film thickness was about 0.1 micrometer. Author

N75-27540*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE DETECTION OF GEOTHERMAL AREAS FROM SKYLAB THERMAL DATA Final Report
Barry S. Siegal (NAS-NRC), Anne B. Kahle, Alexander F. H. Goetz, Alan R. Gillespie, Michael J. Abrams, and Howard A. Pohn (Geol. Survey) 15 Jun. 1975 34 p refs
(Contract NAS7-100)
(NASA-CR-143133; JPL-TM-33-728) Avail: NTIS HC $3.75 CSCL 08G

Skylab-4 X-5 thermal data of the geysers area was analyzed to determine the feasibility of using midday Skylab images to detect geothermal areas. The hottest ground areas indicated on the Skylab image corresponded to south-facing barren or sparsely vegetated slopes. A geothermal area approximately 15 by 30 m coincided with one of the hottest areas indicated by Skylab. This area could not be unambiguously distinguished from the other areas which are believed to be hotter than their surroundings as a result of their topography, and micrometeorological conditions. A simple modification of a previous thermal model was performed and the predicted temperatures for the hottest slopes using representative values was in general agreement with the observed data. It is concluded that data from a single midday Skylab pass cannot be used to locate geothermal areas. Author

N75-27541*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT: US STANDARD CATALOG NO. U-34
30 Jun. 1975 121 p
(NASA-TM-X-72445) Avail: NTIS HC $5.25

Information regarding the availability of LANDSAT imagery processed and input to the data files by the NASA Data Processing Facility is published on a monthly basis. The U.S. Standard Catalog includes imagery covering the continental United States, Alaska, and Hawaii. The Non-U.S. Standard Catalog identifies all the remaining coverage. Sections 1 and 2 describe the contents and format for the catalogs and associated microfilm. Section 3 provides a cross-reference defining the beginning and ending dates for LANDSAT cycles. Author

N75-27542# PRC Information Sciences Co., McLean, Va.
CARTOGRAPHIC DATA BASE HIERARCHY. VOLUME 1: SYSTEMS ANALYSIS AND DESIGN Final Report, Jun. 1972 - Aug. 1973
Donald T. Alvarez and M. Lynn Taylor Sep. 1974 87 p refs
(Contract F30602-72-C-0457)
(AD-A004382; PRC-R-1690-Vol-1; RADC-TR-74-228-Vol-1)
Avail: NTIS CSCL 09/2

The objective of the Cartographic Data Base Hieearchy project was to analyze, design, implement, and test an experimental data base system which employs a hierarchical encoding scheme. Highlights of the implemented system include the following. Design is based on a generalized feature classification system which allows for detailed description of cartographic features. The classification system is composed of feature classes, types, sub-types, eight special descriptors, special numeric, feature name, free text comment, and references to source materials. Implementation, for experimental purposes, is on the Honeywell 635 computer system using Integrated Data Store (IDS) for data management services, and is written in the COBOL Language. Functional capabilities include loading, retrieval, remote query, deletion, and modification. Remote query capability allows a user to interactively communicate with the CDB through a remote terminal for purposes of accessing and retrieving cartographic information. Hierarchical Data Structure which provides for four geographic segmentation levels, two levels of feature segmentation, and two levels of feature description (i.e., subjective and locational). Storage of geographic coordinate strings in a compact incremental format allowing for variable data resolutions. GRA

N75-27543# PRC Information Sciences Co., McLean, Va.
CARTOGRAPHIC DATA BASE HIERARCHY. VOLUME 2: SYSTEM IMPLEMENTATION AND TESTING Final Report, Jun. 1972 - Aug. 1973
Donald T. Alvarez, M. Lynn Taylor, and Gray W. Virkler Sep. 1974 153 p refs
(Contract F30602-72-C-0457)
(AD-A004383; PRC-R-1690-Vol-2; RADC-TR-74-228-Vol-2) Avail: NTIS CSCL 09/2

The purpose of Final Technical Report, Volume II, is to describe the data base system implemented, including: data hierarchy and record structure, data base contents, hardware system used, software modules developed, directions for system users, and summary results of system testing. GRA

N75-27544# PRC Information Sciences Co., McLean, Va.
CARTOGRAPHIC DATA BASE HIERARCHY. VOLUME 3: PROGRAM DOCUMENTATION Final Report, Jun. 1972 - Aug. 1973
Donald T. Alvarez, M. Lynn Taylor, and Gary W. Virkler Sep. 1974 123 p refs
(Contract F30602-72-C-0457)
(AD-A004384; PRC-R-1690-Vol-3; RADC-TR-74-228-Vol-3) Avail: NTIS CSCL 09/2

The purpose of Final Technical Report, Volume III, is to present the experimental CDB software operating environment and program documentation. Section II of this volume describes the operational environment of the CDB system including the software configuration, common data area formats, and file formats. Section III presents the program descriptions. GRA

N75-27545# Massachusetts Univ., Amherst. Water Resources Research Center.
USE OF ECONOMIC-ENVIRONMENTAL INPUT-OUTPUT ANALYSIS FOR COASTAL PLANNING WITH ILLUSTRATION FOR THE CAPE COD REGION
Dennis M. King and David A. Storey 1974 82 p refs
(Contract DI-14-31-0001-3821)
(PB-240918/3; PUB-40; W75-06299; OWRT-A-046-MASS(1)) Avail: NTIS HC $4.75 CSCL 05C

The basic problem in coastal zone management is to determine how the limited set of coastal land and water resources should be allocated among a number of competing human uses or activities. The application of input-output analysis to the coastal zone resources planning process was investigated. The input-output model provides a potential method of displaying within a single framework the economic and environmental impacts of a change in the mix of coastal activities and of displaying tradeoffs between economic and environmental objectives. The economic portions of the model are given empirical content for shoreline activities within a specific planning region, the Cape Cod area of Massachusetts. GRA

N75-27546# Wyoming Univ., Laramie. Dept. of Civil Engineering.
A SUB-ALPINE SNOWMELT RUNOFF MODEL Ph.D. Thesis
Louis E. Allen May 1974 428 p refs
(PB-240754/2; W75-05971; OWRT-A-010-WYO(3)) Avail: NTIS HC $11.25 CSCL 08/1

A digital computer model for simulating daily watershed runoff from snowmelt under subalpine conditions was developed in first generation form for the Nash Fork basin in southeastern Wyoming. Solar radiation is the primary energy source for snowmelt, and its interaction with snowpack is the core of the model. The watershed was sub-divided by cover condition into a forested and an unforested area. The areal extent of snowcover was calculated with a submodel derived through stepwise multiple regression techniques. Insolation, measured in or near the basin, was adjusted to the latitude, slope, and aspect of each segment in the basin, then adjusted for the albedo of the snow surface and combined with the long wave radiation flux for the net radiation exchange producing potential snowmelts. GRA

N75-27547# Oregon State Univ., Corvallis. Dept. of Soils.
CROP RESPONSE TO WARMING SOILS ABOVE THEIR NATURAL TEMPERATURES
K. A. Rykbost, L. Boersma, H. J. Mack, and W. E. Schmisseur Jan. 1974 103 p refs Sponsored by Pacific Power and Light Co. and Off. of Water Resources Res.
(PB-240028; W75-05451; Rept-385) Avail: NTIS CSCL 02C

The subsurface application of heat to soil by circulating the warm water through a network of buried pipes was studied, and the effect of increased soil temperatures on crop production was evaluated. In areas where crop irrigation is required, subsurface irrigation with warm water could be practiced or water taken from the soil heating loop could be applied with sprinklers. Experimental procedures, the crop yield response to soil warming, and the economic feasibility of production using these methods are described. Author

N75-27548# Oregon State Univ., Corvallis. Water Resources Research Inst.
ANIMAL WASTE CONVERSION SYSTEMS BASED ON THERMAL DISCHARGE
L. Boersma, E. W. R. Barlow, J. R. Miner, and H. K. Phinney Sep. 1974 58 p refs Sponsored by Dept. of Interior
(PB-240113; W75-05453) Avail: NTIS CSCL 02C

An animal waste management scheme was developed on the premise that one solution to the problems of pollution and the consumption of nonrenewable resources is the development of integrated production systems with recycled sources. The feasibility of using waste heat from steam electric plants to sustain a food-producing complex which recycles nutrients is analyzed. Specifically, it is proposed to use microorganisms to convert animal waste into a high-protein animal feed and a methane-rich fuel gas. Waste heat from steam electric plants is used as a low-cost source of energy for maintaining stable, elevated temperatures in anaerobic digestion and single cell protein production units. Author

N75-27549# Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
USE OF THERMALLY ENRICHED WATER FOR GROWING FIELD CROPS IN MINNESOTA
E. R. Allred and J. R. Gilley 1974 22 p refs Presented at the Natl. Environ. Conf. Soc. of Civil Engr., Kansas City, Mo., 21-25 Oct. 1974 Sponsored by Dept. of Interior
(PB-240112; W75-05440) Avail: NTIS CSCL 02C

The use of waste heat energy for the growing of agricultural crops near Elk River, Minnesota was evaluated. The base heat transmissibility characteristics of soil was determined and crop frost protection benefits as the result of the soil warming process were examined. Soil warming was shown to be necessary for extension of the growing season for field crops in Minnesota. An irrigation system used alone proved ineffective in soil warming. Artificial warming of a field soil by utilization of waste heat energy failed to provide significant protection for potatoes against frosts at temperatures below 28 F. It was possible to advance the maturity date for early potatoes varieties grown in heated soil between two and three weeks, as compared to potatoes

grown in unheated field soils. Only small quantities of waste heat energy were utilized by a field soil in Minnesota during July and August. Author

N75-27550# Purdue Univ., Lafayette, Ind. Water Resources Research Center.
STUDIES IN FLUVIAL GEOMORPHOLOGY. NO. 2: FORM AND FLUVIAL PROCESSES IN ALLUVIAL STREAM CHANNELS
E. A. Keller and W. N. Melhorn Dec. 1974 138 p refs
(Contract DI-14-31-0001-4014)
(PB-240189/1; TR-47; W75-05526; OWRT-A-022-IND(5)) Avail: NTIS HC $5.75 CSCL 08H

Selected aspects of form and fluvial processes for alluvial channels are defined quantitatively and qualitatively. The fluvial system includes the drainage network, geology, and hydrology. As the drainage network develops from the simple to the complex, the range of bifurcation ratios fluctuates until a nearly constant value is reached. In the formation process of pools and riffles in a stream, there appears to be a balance of the time rate of energy expenditure through the pool-riffle sequence, which allows channel length to increase until a minimum value of energy expenditure is reached. A five-stage model is proposed to explain the development of alluvial channels. GRA

N75-27551# Purdue Univ., Lafayette, Ind. Water Resources Research Center.
STUDIES IN FLUVIAL GEOMORPHOLOGY. NO. 3: DRAINAGE BASIN RESPONSE: DOCUMENTED HISTORICAL CHANGE AND THEORETICAL CONSIDERATIONS
Dorland E. Edgar and Wilton N. Melhorn Dec. 1974 212 p refs
(Contract DI-14-31-0001-4014)
(PB-240188/3; TR-52; W75-05527; OWRT-A-022-IND(6)) Avail: NTIS HC $7.25 CSCL 08H

Owing to limitations in the available data sources, the study was confirmed to a comparison of five drainage basins in the Indian Creek Watershed, located approximately six miles west of West Lafayette, as mapped from 1938 and 1968 aerial photography. By using the Strahler ordering system in combination with other, more recently proposed classification schemes and quantitative parameters, morphometric adjustments in the study basin were determined. All basins showed only minor changes in length, bifurcation, and division ratios with most of the drainage adjustments occurring in the lost or nonintegrated portions of the networks. GRA

N75-27552# New Mexico State Univ., University Park. Water Resources Research Inst.
ENVIRONMENTAL CONTROLS ON GROUNDWATER CHEMISTRY IN NEW MEXICO. 1: THE EFFECT OF PHREATOPHYTES
R. L. Naff, A. A. Baker, and G. W. Gross Feb. 1975 109 p refs Sponsored by Office of Water Research and Technology.
(PB-240190/9; WRRI-052; W75-05531; OWRT-A-030-NM(1)) Avail: NTIS HC $5.25 CSCL 08H

The relationship between phreatophyte-induced evapotranspiration, water level fluctuations, and changes in groundwater quality were investigated with arrays of nested piezometers installed at two sites of the Rio Grande flood plain. Consumption use was computed from continuous water level records. The best correlation was found between consumptive use and averaged maximum daily temperature, while a lack of direct recharge from precipitation at the site was indicated. The chemical characteristics of the groundwater in this area appear to be determined by mixing of waters of different chemical composition. In general, the groundwater of this area has a calcium sulfate character. GRA

N75-27553# Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
WATERSHED BEHAVIOR UNDER CONTROLLED SIMULATED RAINFALL Completion Report
James A. Lynch, William E. Sopper, and Edward S. Corbett Dec. 1974 82 p refs
(Contract DI-14-31-0001-3124)
(PB-240921/7; OWRT-B-028-PA(2); W75-06192) Avail: NTIS HC $4.75 CSCL 08H

For hydrologic behavior and response of a small, natural forested drainage basin, an irrigation system was designed and installed to apply uniformly simulated rainfall on any/all parts of a 20-acre watershed. Effects of antecedent soil moisture and storm size on simulated rainfall disposition and storm hydrograph characteristics were analyzed. Hydrologic behavior and response of the watershed to controlled area applications of simulated rainfall were evaluated. High antecendent soil moisture content increased quickflow volume and peak-flow rate, decreased time to peak, time of recession and storm duration. GRA

N75-27554# Bureau of Mines, Laramie, Wyo. Energy Research Center.
DETERMINATION OF CARBONATE MINERALS OF GREEN RIVER FORMATION OIL SHALES, PICEANCE CREEK BASIN, COLORADO
N. B. Young, J. W. Smith, and W. A. Robb Jan. 1975 46 p refs
(PB-240669/2; BM-RI-8008) Avail: NTIS HC $3.75 CSCL 08G

Quantification of carbonate minerals is important for the characterization of oil shale, particularly because of their thermal activity in production of oil from shale. The carbonate minerals found in this oil shale are nahcolite (NaHC O3), dawsonite (NaAl(OH)2CO3), Dolomite (mg(1-x)fe(x))Ca(CO3)2), calcite (CaCO3), and ferroan (Mg(1-x)Fe(x))CO3). While carbonate minerals can be removed by acid extraction from the balance of the oil shale, direct determination of carbonate minerals is complicated by the occurrence of the same cations in more than one mineral. A method for assigning the acid-soluble cations to the individual carbonate minerals was developed from two assumptions based on oil shale geochemistry. GRA

N75-27555# Massachusetts Inst. of Tech., Cambridge. Urban Systems Lab.
A SURVEY OF NATIONAL GEOCODING SYSTEMS Final Report, Oct. 1973 - Jun. 1974
Pamela A. Werner Nov. 1974 356 p refs
(Contract DOT-TSC-692)
(PB-239601/8; DOT-TSC-OST-74-26) Avail: NTIS HC $10.00 CSCL 08F

Major geocoding systems are described. Emphasis is placed on the following systems: geopolitical systems that provide general reference coding structures for administrative or other purposes; systems that reference either special significance locations or a combination of geopolitical, geostatistical, and special significance locations; systems that reference areas delineated according to special criteria, such economic or postal distribution patterns; and systems based on grid networks. GRA

N75-27556# Esso Research Center, Abingdon (England).
CHEMICALLY ACTIVE FLUID-BED PROCESS FOR SULPHUR REMOVAL DURING GASIFICATION OF HEAVY FUEL OIL, PHASE 2 Report for Jul. 1972 - May 1974
J. W. T. Craig, G. L. Johnes, Z. Kowszun, G. Moss, and J. H. Taylor Nov. 1974 598 p refs
(Contract EPA-68-02-0300)
(PB-240632/0; EPA-650/2-74-109) Avail: NTIS HC $13.25 CSCL 07A

The chemically active fluid bed process for desulfurizing gasification of heavy fuel oil in a bed of hot lime was studied. The first continuous pilot plant test with U.S. Limestone BCR 1691 experienced local stone sintering and severe production of sticky dust during startup. Batch tests confirmed that BCR 1691 produced more dust than the purer Denbighshire or U.S. BCR 1359 stones. With BCR 1691, 10 times more dust was produced during kerosene combustion at 870C than during gasification/Regeneration. The continuous pilot plant was modified to improve operability under dusty conditions. GRA

N75-27194* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
APPLICATION OF VERY LONG BASELINE INTERFEROMETRY TO ASTROMETRY AND GEODESY: EFFECTS OF FREQUENCY STANDARD INSTABILITY ON ACCURACY
T. A. Clark, A. R. Whitney (Northeast Radio Observatory Corp.),

A. E. E. Rogers (Northeast Radio Observatory Corp.), H. F. Hinteregger (Northeast Radio Observatory Corp.), L. B. Hanson (Northeast Radio Observatory Corp.), C. C. Counselman, III (Mass. Inst. of Tech., Cambridge), and I. I. Shapiro (Mass. Inst. of Tech.) *In* Its Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 349-359 refs (For availability see N75-27173 18-31)
CSCL 08E

N75-27449 Joint Publications Research Service, Arlington, Va.
OBSERVATIONS USING FRENCH ELECTRONIC EQUIPMENT AND THE EOLE SATELLITE
I. V. Farengolts *In its* Soviet Antarctic Inform. Bull. (JPRS-64980) 11 Jun. 1975 p 23-27 refs Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 105-109 (For availability see N75-27444 18-42)

N75-27460 Joint Publications Research Service, Arlington, Va.
FREEZING OF RIVERS WITH AND WITHOUT THE FORMATION OF JAMS
I. Ya. Liser *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 93-111 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 77-83 (For availability see N75-27450 18-42)

N75-27463 Joint Publications Research Service, Arlington, Va.
PROCEDURE FOR EVALUATING TRENDS IN RIVER RUNOFF
P. P. Denisov *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 128-132 Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 101-104 (For availability see N75-27450 18-42)

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N75-27557*+ National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ENERGY: AN ANNOTATED BIBLIOGRAPHY
Sandra J. Blow, comp. Aug. 1974 749 p refs
(NASA-TM-X-66766; Bib-74-01) Avail: NTIS HC $17.25 CSCL 10A

This bibliography is a compilation of approximately 4,300 selected references on energy and energy related topics. The references are arranged by date, with the latest works first, in the following subject categories: (1) energy and power - general; resources, supply/demand, and forecasting; policy, legislation, and regulation; research and development; environment; consumption and economics; and conservation, (2) energy and power sources - general, fossil fuels, hydrogen and methanol, organic wastes and waste heat, nuclear, geothermal, solar, wind, ocean/water, magnetohydrodynamics and electrohydrodynamics, and gas and steam turbines, and (3) energy and power storage and transmission. Literature from bibliographic sources dated January 1972 through July 1974 is covered, with some pertinent literature prior to 1972 included. Author

N75-27558*+ National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ENERGY: AN ANNOTATED BIBLIOGRAPHY
Sandra J. Blow, comp. Feb. 1975 550 p refs
(NASA-TM-X-72433; Bib-74-01-App-1) Avail: NTIS HC $12.50 CSCL 10A

This bibliography is the first update of a previous energy bibliography dated August 1974. It contains approximately 3,300 selected references on energy and energy related topics from bibliographic sources dated August 1974 through December 1974. The references are arranged by date, with the latest works first, in subject categories. (1) Energy and power - general; resources, supply/demand, and forecasting; policy, legislation, and regulation; research and development, environment; consumption and economics; conservation; and systems analysis. (2) Energy and power sources - general; fossil fuels; hydrogen and other fuels; organic wastes and waste heat; nuclear; geothermal; solar; wind; ocean/water; magnetohydrodynamics and electrohydrodynamics; and gas and steam turbines. (3) Energy and power storage and transmission. Author

N75-27559# Massachusetts Inst. of Tech., Cambridge.
CYCLE STUDY OF A MERCURY-COLLOIDAL ELECTRO-FLUID DYNAMIC POWER GENERATOR M.S. Thesis. Interim Report, 18 Apr. - 17 Jul. 1972
Beatriz Urquidi Oct. 1974 70 p refs
(Contracts F33615-72-C-1258; F33615-69-C-114; AF Proj. 7116)
(AD-A004814; ARL-74-0127; pr-3) Avail: NTIS CSCL 10/2

The author presents a study of an Electro-Fluid-Dynamic power system using mercury as the working vapor and hydrogen as the fill gas. Viscous coupling between mercury vapor and hydrogen is assumed. A detailed study of the various components, and related efficiencies, of the system is made and expressions for their dependence on various system parameters are derived. The overall system efficiency is optimized and analytical expressions for the optimum values of the operating parameters are given. A sensitivity analysis is made to determine the effect, on the efficiency of changes in several system parameters. Numerical calculations are carried out using a simple computer program. The results of the calculations are shown in graphical and tabular form. As an illustration, a 12.5 KW output power generator is considered and the main design characteristics are presented. GRA

N75-27560*# National Aeronautics and Space Administration. Pasadena Office, Calif.
SOLAR POND Patent Application
Charles G. Miller (JPL) and James B. Stephens, inventors (to NASA) (JPL) Filed 27 Jun. 1975 18 p
(Contract NAS7-100)
(NASA-Case-NPO-13581-1; US-Patent-Appl-SN-590975) Avail: NTIS HC $3.25 CSCL 10A

Solar ponds were designed for the purpose of collecting low-temperature thermal energy on a large scale. The shallow pools include a number of narrow, elongated, grouped trenches with heat-absorbing black liners, and containing either a brine solution or plain water, depending on the means used to remove the thermal energy from the pond. The heat-absorbing liquid is kept separate from the thermal energy removing fluid by means such as transparent fluid or solid. NASA

N75-27561*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MECHANICAL THERMAL MOTOR Patent Application
Leopold A. Hein and William N. Myers, inventors (to NASA) Filed 30 Jun. 1975 21 p
(NASA-Case-MFS-23062-1; US-Patent-Appl-SN-591569) Avail: NTIS HC $3.25 CSCL 10A

A mechanical thermal motor was designed for converting thermal energy, such as solar energy, into mechanical motion for driving a pump. The thermal motor uses heated fluid produced by solar energy coming directly from the sun or through other fluid heaters. The motor includes a stationary core supported on a base structure. A cylindrical disc plate is carried adjacent a lower portion of the inner core and extends radially. An inner concentric cylinder encircles the inner core and is fixed by a number of radially extending spokes. An outer concentric cylinder encircles the inner concentric cylinder, and a spiral tube is coiled in the space between the two cylinders. The reciprocating motion of the spiral tube as it expands and contracts on the outer concentric cylinder is used as the input drive to a pump. NASA

N75-27562*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FLUID MANIFOLD DESIGN FOR A SOLAR ENERGY STORAGE TANK
W. R. Humphries, H. C. Hewitt (Tennessee Technological Univ.),

and E. I. Griggs (Tennessee Technological Univ.) Jun. 1975 21 p
(NASA-TM-X-64940) HC $3.25 CSCL 10B

A design technique for a fluid manifold for use in a solar energy storage tank is given. This analytical treatment generalizes the fluid equations pertinent to manifold design, giving manifold pressures, velocities, and orifice pressure differentials in terms of appropriate fluid and manifold geometry parameters. Experimental results used to corroborate analytical predictions are presented. These data indicate that variations in discharge coefficients due to variations in orifices can cause deviations between analytical predictions and actual performance values.
Author

N75-27563*# Kanner (Leo) Associates, Redwood City, Calif.
CARBON ISOTOPES IN OIL-GAS GEOLOGY
E. M. Galimov Washington NASA Jun. 1975 409 p refs Transl. into ENGLISH of the book "Izotopy Ugleroda v Neftegazovoy Geologii" Moscow, Nedra Press, 1973 p 1-384
(Contract NASw-2481)
(NASA-TT-F-682) Avail: NTIS HC $10.50 CSCL 08G

Analysis of variations in the natural abundances of the carbon isotopes C12 and C13 in petroleum, gases, bitumens, and other materials is treated. A theoretical-calculation division gives data on the thermodynamic isotope effects of organic compounds, and presents a theory of biogenic isotope equilibria and intramolecular isotope nonuniformity of bio-organic compounds. Laboratory studies of processes simulating natural fractionation of carbon isotopes are emphasized; included are data on the isotopic composition of individual hydrocarbons. Possible pathways of their formation were examined, and a general model of the petroleum-forming process is proposed. Within the bounds of a specific region, genetical types of petroleum are found, and their areal and profile distributions were determined. Author

N75-27564*# National Aeronautics and Space Administration. National Space Technology Labs., Bay Saint Louis, Miss.
BIO-CONVERSION OF WATER HYACINTHS INTO METHANE GAS, PART 1
B. C. Wolverton, R. C. McDonald, and J. Gordon Jul. 1974 13 p refs
(NASA-TM-X-72725) Avail: NTIS HC $3.25 CSCL 10A

Bio-gas and methane production from the microbial anaerobic decomposition of water hyacinths (Eichhornia crassipes) (Mart) Solms was investigated. These experiments demonstrated the ability of water hyacinths to produce an average of 13.9 ml of methane gas per gram of wet plant weight. This study revealed that sample preparation had no significant effect on bio-gas and/or methane production. Pollution of water hyacinths by two toxic heavy materials, nickel and cadmium, increased the rate of methane production from 51.8 ml/day for non-contaminated plants incubated at 36 C to 81.0 ml/day for Ni-Cd contaminated plants incubated at the same temperature. The methane content of bio-gas evolved from the anaerobic decomposition of Ni-Cd contaminated plants was 91.1 percent as compared to 69.2 percent methane content of bio-gas collected from the fermentation of non-contaminated plants. Author

N75-27565*# Texas Univ., Austin. Center for Energy Studies.
TECHNOLOGY ASSESSMENT OF PORTABLE ENERGY RDT AND P
John H. Vanston, Jr., W. Parker Frisbie, and Dudley L. Poston [1975] 303 p refs
(Contract NAS2-8444)
(NASA-CR-137655; Study-2B) Avail: NTIS HC $9.25 CSCL 10B

Results are presented of a workshop conducted to assess portable energy technology. The results were evaluated and areas for future research were considered. Several research categories were studied: increasing presently available fuel supplies, developing new fuel sources, utilization of new transportation fuels, improving conservation practices, and equitable distribution of fuel supplies. Several research projects were proposed, and work statements were constructed for those considered suitable. Author

N75-27566*# TRW Systems Group, Redondo Beach, Calif.
A STUDY OF SHORT TEST AND CHARGE RETENTION TEST METHODS FOR NICKEL-CADMIUM SPACECRAFT CELLS Final Report
Willard R. Scott Apr. 1975 193 p refs Prepared for JPL
(Contracts NAS7-100; JPL-953649)
(NASA-CR-143189; TRW-24118-6003-RU-00) Avail: NTIS HC $7.00 CSCL 10A

Methods for testing nickel-cadmium cells for internal shorts and charge retention were studied. Included were (a) open circuit voltage decay after a brief charge, (b) open circuit voltage recovery after shorting, and (c) open circuit voltage decay and capacity loss after a full charge. The investigation included consideration of the effects of prior history, of conditioning cells prior to testing, and of various test method variables on the results of the tests. Sensitivity of the tests was calibrated in terms of equivalent external resistance. The results were correlated. It was shown that a large number of variables may affect the results of these tests. It is concluded that the voltage decay after a brief charge and the voltage recovery methods are more sensitive than the charged stand method, and can detect an internal short equivalent to a resistance of about (10,000/C)ohms where 'C' is the numerical value of the capacity of the cell in ampere hours.
Author

N75-27567*# Hampton Inst., Va. Dept. of Agriculture.
SPACE AND ENERGY CONSERVATION HOUSING PROTOTYPE UNIT DEVELOPMENT Final Report, Apr. - Aug. 1975
Donald R. Sunshine Aug. 1975 50 p refs
(Grant NsG-1162)
(NASA-CR-143201) Avail: NTIS HC $3.75 CSCL 10A

Construction plans are discussed for a house which will demonstrate the application of advanced technology to minimize energy requirements and to help direct further development in home construction by defining the interaction of integrated energy and water systems with building configuration and construction materials. Housing unit designs are provided and procedures for the analysis of a variety of housing strategies are developed.
Author

N75-27568# Boeing Co., Seattle, Wash.
REAL-TIME SPACE AND NUCLEAR EFFECTS ON SOLAR CELLS ACCELERATED EVALUATION METHODS, VOLUME 3 Final Report, May 1971 - Jul. 1974
W. E. Horne, R. B. Greegor, M. C. Wilkinson, and B. K. Madaras Jul. 1974 277 p refs
(Contract F33615-71-C-1583)
(AD-A003509; D180-10491-4-Vol-3; AFAPL-TR-72-69-Vol-3) Avail: NTIS CSCL 10/2

A technique was developed for the accelerated evaluation of silicon solar cells to be used in extended space missions during which weapons environments may also be encountered. Standard N/P silicon cells, as well as lithium-doped silicon cells, were used as test samples during the development and verification of the evaluation method. The solar cell damage model developed represents a significant advancement for predicting space performance of solar cells. The model is capable of (1) accounting for the shielding of solar arrays, (2) integrating over the space environment for both protons and electrons, (3) calculating defect densities as a function of position inside the solar cell, (4) calculating the output I-V characteristics of solar cells under a solar illumination spectrum, and (5) accounting for annealing in lithium doped P/N solar cells. GRA

N75-27569# Wisconsin Univ., Madison. Mathematics Research Center.
A SIMULATION MODEL OF THE DEVELOPMENT OF PETROLEUM REFINING CAPACITY
M. A. Lindsay Nov. 1974 40 p refs Sponsored in part by NSF
(Contract DA-31-124-ARO(D)-462)
(AD-A003723; MRC-TSR-1500) Avail: NTIS CSCL 05/3

A recursive linear programming model of investment decision making is developed and used to simulate investment behavior in the U. S. petroleum industry. The model approximates industry performance from 1955-1971. This suggests that it would provide

a useful tool for exploring the implications of environmental regulations and other policy issues involving the industry. GRA

N75-27570# Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
AN AGRO-POWER-WASTE WATER COMPLEX FOR LAND DISPOSAL OF WASTE HEAT AND WASTE WATER
David R. DeWalle Jun. 1974 208 p refs
(Grant NSF GI-35100)
(PB-239675/2; NSF/RA/E-74-016) Avail: NTIS HC $7.25 CSCL 13B

An agro-power-waste water complex was evaluated as a system in which waste heat from power generation was dissipated by recycling hot water through a pipe network buried in agricultural land. Concurrently, municipal waste water was renovated by sprinkler irrigation on the land and served to maintain a high soil moisture content and soil thermal conductivity. A 0.23 acre field prototype of the agro-power-waste water complex was constructed and measurements were obtained of soil temperature, soil thermal conductivity, heat dissipation, degree of waste water renovation and soil surface temperature used in a system analysis. A nuclear fuel penalty concept was used in comparing this system with conventional heat dissipation systems. GRA

N75-27571# Mitre Corp., McLean, Va.
URBAN TRASH METHANATION BACKGROUND FOR A PROOF-OF-CONCEPT EXPERIMENT
C. Bisselle, M. Kornreich, M. Schooll, and P. Spewak Feb. 1975 145 p refs
(Contract NSF C-938)
(PB-240768/2; MTR-6856; NSF/RA/N-75-002) Avail: NTIS HC $5.75 CSCL 13B

Urban trash methanation (UTM) involves the economic production of pipeline quality fuel gas by the anaerobic digestion of the large organic fraction of municipal solid waste. The UTM process involves four major areas: (1) feed preparation, which includes size reduction and separation of the digestible from the undigestible fraction; (2) digestion (which includes the mixing of the feed, the biological processes of destruction of volatile solids and production of gas, and the reactor variables which affect these processes); (3) dewatering and ultimate disposal of the undigested residue; and, (4) gas preparation, which includes the separation of carbon dioxide from the methane, and the elimination of moisture from the gas. GRA

N75-27572# Bureau of Mines, Pittsburgh, Pa. Energy Research Center.
CONVERSION OF CELLULOSIC WASTES TO OIL Report of Investigations 1971 - 1973
H. R. Appell, Y. C. Fu, E. G. Illig, F. W. Steffgen, and R. D. Miller Feb. 1975 34 p refs
(PB-240839/1; BM-RI-8013) Avail: NTIS HC $3.75 CSCL 13B

The Bureau of Mines studied the conversion of a variety of cellulosic wastes (sawdust, bovine manure, sewage sludge, urban refuse (free of metal and ceramics)) to heavy oils. The reactions took place in the presence of synthesis gas and water or carbon monoxide and water under conditions of elevated temperatures and pressures. Waste conversions above 90 percent, often near 99 percent, with oil yields in the range of 40 to 60 percent, were obtained in the temperature range of 250 to 425C and pressure range of 1,500 to 4,000 psig. Cobalt molybdate on alumina catalyst, used with sodium carbonate, gave a product of lower viscosity and lower oxygen content than when using sodium carbonate as the sole catalyst. GRA

N75-27573# General Electric Co., Schenectady, N.Y.
LONG TERM POWER SYSTEM DYNAMICS. VOLUME 1: SUMMARY AND TECHNICAL REPORT Final Report
Jun. 1974 233 p refs Sponsored by Electric Power Res. Inst. 2 Vol.
(PB-240799/7; EPRI-907-0-Vol-1) Avail: NTIS HC $7.50 CSCL 09C

The goal of the project was to analyze longterm (up to 20 min.) dynamic behavior leading to power system 'split-up' and to develop digital simulation techniques to model this behavior. Eighteen disturbances leading to the break-up of a power system into two or more subsystems are documented in the final report. Analysis of these disturbances led to a modeling approach, which combined an aggregate model of system frequency for the long-term dynamic behavior with a detailed model for analysis of high-speed transients. The computation expense for this initial digital computer program was less than 10 percent of the expense for a conventional transient stability program, and it is anticipated that further reduction in computation cost can be achieved. GRA

N75-27574# General Electric Co., Schenectady, N.Y.
LONG TERM POWER SYSTEM DYNAMICS. VOLUME 2: LONG-TERM POWER SYSTEM DYNAMICS SIMULATION PROGRAM Final Report
Oct. 1974 306 p Sponsored by Electric Power Res. Inst. 2 Vol.
(PB-240800/3; EPRI-907-0-Vol-2) Avail: NTIS HC $9.25 CSCL 09C

The report describes the long-term dynamic simulation program (LOTDYS) as it was developed for this project. It is both a programmer's guide and a user's guide for LOTDYS. It contains a list and description of the program variables, the program itself and the data required to run one of the sample cases of Section 1B-4. GRA

N75-27575# Illinois Univ., Chicago. Energy Resources Center.
PROCEEDINGS OF THE 2ND ANNUAL ILLINOIS ENERGY CONFERENCE
1974 222 p refs Conf. held at Chicago, 24-25 Jun. 1974
(Grant NSF GT-44112)
(PB-240548/8; NSF/RA/G-74-022) Avail: NTIS HC $7.25 CSCL 10A

The report includes five major topics: (1) energy conservation in the residential-commercial sector; (2) energy conservation in industry and agriculture; (3) energy management in utilities; (4) energy conservation in transportation; and (5) energy conservation policy. GRA

N75-27576# Committee on Government Operations (U. S. Senate).
CURRENT ENERGY SHORTAGES OVERSIGHT SERIES: OIL BROKERS, PART 7
Washington GPO 1974 98 p refs Hearings pursuant to Section 4, Senate Resolution 46 before Permanent Subcomm. on Investigations of Comm. on Govt. Operations, 93d Congr., 2d Sess., 4 and 10 Apr. 1974
(GPO-32-607) Avail: SOD HC $1.10

The impact of energy shortages is examined in terms of the role of brokers in petroleum transactions. The activities of brokers, traders, and other middlemen who are transacting, or trying to transact, oil deals during periods of petroleum shortages are investigated. An attempt is made to determine if price increases are the result of profiteering. J.M.S.

N75-27577# Applied Urbanetics, Inc., Washington, D.C.
PROJECT CONSERVE, A PILOT PROJECT IN HOMEOWNER ENERGY CONSERVATION Final Report, 26 Feb. - 31 Oct. 1974
Robert Stroh 31 Oct. 1974 88 p
(Contract DI-14-01-001-1676)
(PB-240407/7; FEA/PD-225-D) Avail: NTIS HC $4.75 CSCL 10A

Data voluntarily supplied by homeowners were processed by computer to produce a report containing the costs and savings of do-it-yourself or contractor-installed energy conserving retrofit actions: storm windows and doors, ceiling insulation, weather stripping, caulking, or thermostat set back. Validation demonstrated that data produced conservatively accurate estimates of costs and savings. Project Conserve produced a data base of existing physical and operational energy conserving characteristics of homes in a city, plus potential for conservation. GRA

N75-27578# Wisconsin Univ., Madison. Marine Studies Center.
THE HOUSEHOLD ENERGY GAME
Thomas W. Smith and John Jenkins Dec. 1974 30 p
(COM-75-10304/4; WIS-SG-74-409; NOAA-75020306; Contrib-25) Avail: NTIS HC $3.75 CSCL 10A

A technique is presented which compares the energy consumption rate of such things as transportation, home heating and cooling, and use of electrical appliances. Methods are implemented which modify the 'energy budget' and conserve energy in the home. GRA

N75-27579# National Center for Energy Management and Power, Philadelphia, Pa.
ENERGY RATIONING AND ENERGY CONSERVATION: FOUNDATIONS FOR A SOCIAL POLICY
1974 35 p refs
(Grant NSF GI-29729)
(PB-239766; NSF/RA/N-74-152) Avail: NTIS CSCL 05A

Energy rationing and energy conservation policies are discussed. Topics covered include the nature of and occasions for rationing, two previous rationing programs and their problems, rationing as an allocative law, the social organization of energy consumption, and an energy conservation program. The relation between social activities and energy consumption is illustrated using industrial culture and organization for war. Author

N75-27580# Michigan Univ., Ann Arbor.
EFFECT OF FUEL ADDITIVES STUDY Final Report
D. M. Steffenson, D. H. Stedman, and D. J. Patterson May 1974 54 p refs
(Grant EPA-R-802418)
(PB-240169/3; EPA-650/2-74-096) Avail: NTIS HC $4.25 CSCL 21D

Studies were carried out on the optimization of a chemiluminescent NO detector. This detector was used to study the effect of N containing fuel additive combustion using a gas chromatographic (GC) technique. Progress indicated N selective GC detection down to 1.6 ng of diethyl nitrosamine (approximately 0.5 ppm in a 1 m1 gas sample). Similar data were obtained for amines. The detector has at least two orders of magnitude more sensitivity then demonstrated; problems with the GC columns hindered optimum performance. Preliminary studies were made of rapid determination of total N in gasoline, and of combustion products in a flat flame propane-air burner. GRA

N75-27581# Dynatherm Corp., Cockeysville, Md.
SNOW AND ICE REMOVAL FROM PAVEMENTS USING STORED EARTH ENERGY
W. B. Bienert, M. F. Pravda, H. H. Suelau, and D. A. Wolf 31 May 1974 217 p refs
(Contract DOT-FH-11-7413)
(PB-240623/9; DTM-74-4; FHWA-RD-75-6) Avail: NTIS HC $7.25 CSCL 13B

The technical feasibility of using earth heat in combination with heat pipes for deicing and removing snow from pavement surfaces has been demonstrated (in the Baltimore/Washington climate) in testing conducted at the Fairbank Highway Research Station (located at McLean, Virginia) during two winters. This report describes the analytical models constructed to describe earth heated pavement systems, and the validation of these models as a result of the testing conducted. A highway engineer's user section is included in this report which provides step-by-step examples of how pavement heating systems may be defined and specified. The user section also describes step-by-step procedures for defining electrically heated pavements. GRA

N75-27582# Bureau of Mines, Bartlesville, Okla. Energy Research Center.
QUALITATIVE CHARACTERIZATION OF 370 DEGREES TO 535 DEGREES C AROMATIC CONCENTRATES OF CRUDE OILS FROM GPC ANALYSES
D. E. Hirsch, J. E. Dooley, H. J. Coleman, and C. J. Thompson Dec. 1974 31 p refs
(PB-240844/1; BM-RI-7974) Avail: NTIS HC $3.75 CSCL 07C

Interpretive factors relating compound structure to gel permeation chromotography (GPC) retention volume were developed to aid in the characterization of aromatic concentrates derived from high-boiling petroleum distillates. These factors have resulted in qualitative analytical formats that are apparently applicable to any high-boiling aromatic concentrate. Characteristics of these formats are discussed, and the qualitative characterization data obtained from the application of GPC and mass spectrometry to the 370 to 535 C aromatic concentrates of four crude oil distillates are summarized. GRA

N75-27583# Battelle Columbus Labs., Ohio.
ASSESSMENT OF THE POTENTIAL OF CLEAN FUELS AND ENERGY TECHNOLOGY Final Report
Elton Hall, Paul Choi, and Edward Kropp Feb. 1974 193 p refs
(Contract EPA-68-01-2114)
(PB-239970/7; EPA-600/2-74-001) Avail: NTIS; SOD HC as Stock No. 5501-00960 CSCL 07A

A study was conducted to assess the potential of fuel cleaning, fuel conversion, and emission control technologies, to reduce air emissions from fuel/energy processes to the year 2000. Total emissions and effluents produced by fuelburning systems to the year 2000 were calculated according to three different scenarios reflecting different technology availability and fuel allocation. The impact of these emissions on ambient air quality was analyzed. An overall index was developed for comparison of the potential usefulness of the energy technologies under consideration. Research and development priorities were recommended. GRA

N75-27584# Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
STATE-OF-THE-ART FOR THE INORGANIC CHEMICAL INDUSTRY: INDUSTRIAL INORGANIC GASES Environmental Protection Technology Series
James W. Patterson and Roger A. Minear Mar. 1975 57 p refs
(Grant EPA-R-800857)
(PB-240961/3; EPA-600/2-74-009C) Avail: NTIS HC $4.25 HC also available from NTIS $11.00/set of 3 reports as PB-240958-SET CSCL 07A

The inorganics gas industry was reviewed. It was found that the major effluent of the industry is cooling water, which is contaminated with raw product condensates, oil and grease, and water supply and cooling water treatment chemicals. Spent scrubber solutions from product purification may also constitute a significant waste, although newer production technology eliminates this aspect, as well as oil and grease. Control and abatement strategies are briefly discussed. GRA

N75-27203* Naval Research Lab., Washington, D.C.
RESULTS OF THE FIRST 150 DAYS OF THE NTS-1 SOLAR CELL EXPERIMENTS
Richard L. Statler *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Internal (PTTI) Planning Meeting 1974 p 503-511 refs (For availability see N75-27173 18-31)
CSCL 10A

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N75-27585* National Aeronautics and Space Administration. Pasadena Office, Calif.
FLUORESCENCE DETECTOR FOR MONITORING ATMOSPHERIC POLLUTANTS Patent
Robert T. Menzies, inventor (to NASA) (JPL) Issued 24 Jun. 1975 7 p Filed 27 Dec. 1973 Supersedes N74-25932 (12 - 15, p 1790) Sponsored by NASA
(NASA-Case-NPO-13231-1; US-Patent-3,891,848; US-Patent-Appl-SN-428993; US-Patent-Class-250-345; US-Patent-Class-250-343; US-Patent-Class-250-432) Avail: US Patent Office CSCL 14B

A device for the detection of pollutant gas molecules in the atmosphere is described. A laser source excites the atmospheric area which contains the pollutants to be analyzed. The laser beam causes the pollutants to fluoresce and emit a return signal to the detector. The detector includes a gas cell that contains a compartment filled with the pollutant to be studied. This compartment absorbs the fluorescence from the reflected pollutant signal received at the detector. Another compartment is provided in the gas cell and the fluorescence of the reflected pollutant

signal passes unimpeded through this second compartment. A difference measuring circuit detects the difference in output signals from the two compartments in order to obtain a signal indicative of the magnitude of the pollutant being analyzed.
Official Gazette of the U.S. Patent Office

N75-27586 North Carolina State Univ., Raleigh.
VARIOUS ASPECTS OF SLUDGE DEGRADATION Ph.D. Thesis
Robert Dell Rogers 1974 80 p
Avail: Univ. Microfilms Order No. 75-15158

Evolution of carbon dioxide was used as an index of sludge carbon utilization. It was found that digested sludge maintained a higher respiration rate when not incorporated into soils or sand. Previously nonexposed soil and beach sand utilized significantly more sludge carbon than soil previously exposed to sludge. Nitrogen mineralization took place in unincorporated, digested sludge and nitrification of ammonia in the soil-sludge mixture. Soon after sludge application, the pH values of treated soils increased significantly, then gradually decreased below the original values. Chemical analyses of different sludges and soil-sludge mixtures indicated that heavy metals became associated with various organic fractions, but also that the metals were not released during sludge decomposition. Studies of organic composition revealed that raw sludge lost 35 percent of its ether solubles and 74 percent of the hexose solubilized by sulfuric acid. The resulting digested sludge appeared to be stabilized. No sequential degradative patterns were detected for either stockpiled sludge or soil incorporated sludge. Dissert. Abstr.

N75-27587 North Carolina Univ., Chapel Hill.
PULSE PROCESSING FROM PARTICLE DETECTORS Ph.D. Thesis
David Reeves Hemenway 1974 213 p
Avail: Univ. Microfilms Order No. 75-15649

Automatic particle detectors are used in the study of particle size distribution in the fields of air pollution and industrial hygiene. Electronic methods used to detect the peak height from the particle detector signal and shape the output pulse to meet the signal input requirements of the multichannel analyser pulse stretching and pulse differentiation. A peak detector circuit was constructed that had the stability of the pulse stretching circuit without imposing any dead time signal loss on the particle detector. The output pulse from this peak detector was independent of input signal waveform and signal frequency up to 5000 Hz. The peak detector was used with two particle detectors: A Royco 220 light scattering particle detector and an acoustical counter. On the basis of electronic calibration the detector produced no widening in the distribution of signals received by the multi-channel analyser. With the use of the peak detector circuit the acoustial counter performance was demonstrated to be highly dependent on the flow rate through the counter. Dissert. Abstr.

N75-27588 Maryland Univ., College Park.
A STUDY OF TRACE ELEMENTS ON PARTICULATES FROM MOTOR VEHICLES Ph.D. Thesis
John Michael Ondov 1974 347 p
Avail: Univ. Microfilms Order No. 75-14309

The contribution of primary motor vehicle particular emissions to observed trace element inventories in urban areas was examined. Relative emission strengths and particle size distributions were determined for elemental emissions. Emissions observed were related to motor vehicle source materials. Filter, cascade impactor, and surface soil samples obtained at several distances from Route 1 in Beltsville, Maryland, and at the Baltimore Harbor Tunnel, and samples of tires, brake lining material, and lubricating oil were analyzed for up to 27 elements by instrumental neutron and photon activation analysis and atomic absorption spectrometry. The Ba/Pb ratio of aerosols from motor vehicles suggest that motor vehicles are a major source of Ba in many U.S. cities. Except for Pb, Br and Cl, the motor vehicle contributions for most elements account for < 25 percent of the observed atmospheric concentrations in the most cities. The motor vehicle contribution for Zn was shown to account for less than or equal to 30 percent of observed concentrations in U.S. cities.
Dissert. Abstr.

N75-27589 Washington Univ., Seattle.
DEVELOPMENT OF A PROBE FOR THE DETECTION OF ORGANIC VAPORS IN AIR Ph.D. Thesis
John Leo Kieffer 1974 274 p
Avail: Univ. Microfilms Order No. 75-14927

The development and design data for an electro-nose capable of monitoring trace organics (odors) in the ambient air is presented. The electro-nose operates on a principle similar to the functioning of the human nose. An output signature is noted when an odoriferous material is adsorbed on the probe of the instrument. The construction and testing of the probe is described in detail. The probe gives a differential temperature response from its polymer and glass coated thermistors, as the response arises from the differential heat of adsorption of the probe. The response is registered in millivolts on a strip chart recorder, and is the unique signature for a given odorous organic chemical vapor. The signature indicates the effect of this chemical vapor on four polymer probes and is used to identify the organic chemical family to which it belongs by comparison with other signatures.
Dissert. Abstr.

N75-27590# Joint Publications Research Service, Arlington, Va.
HIGH-ALTITUDE AIRCRAFT AND THE STRATOSPHERE
I. L. Karol 8 Jul. 1975 53 p refs Transl. into ENGLISH from the book "Vysotnyye Samolety i Stratosfera" Moscow, Gidrometeoizdat, 1974 p 1-49
(JPRS-65171) Avail: NTIS HC $4.25

Possible changes in the composition of the stratosphere as a result of the effect exerted on it by the discharge of combustion products from engines of high-altitude aircraft were studied taking into account predictions of the development of supersonic transport aircraft in the 1980's. Investigations of photochemical reactions between atmospheric gases, the exhaust of aircraft and planetary distributions of the content of photochemically active small impurities in the stratosphere (especially ozone), were also considered. For individual titles, see N75-27591 through N75-27596.

N75-27591 Joint Publications Research Service, Arlington, Va.
DISCHARGE OF THE COMBUSTION PRODUCTS OF AIRCRAFT ENGINES INTO THE STRATOSPHERE
I. L. Karol *In its* High-Altitude Aircraft and the Stratosphere (JPRS-65171) 8 Jul. 1975 p 3-5 Transl. into ENGLISH from the book "Vysotnyye Samolety i Stratosfera" Moscow, Gidrometeoizdat, 1974 (For availability see N75-27590 18-45)

The contamination of the stratosphere by discharge of CO2, H2O, SO2, CO, and NO from aircraft engines is discussed. SST flights from Western Europe to the east coast of the United States are considered. F.O.S.

N75-27592 Joint Publications Research Service, Arlington, Va.
PHOTOCHEMICAL REACTIONS OF GASES IN THE STRATOSPHERE
I. L. Karol *In its* High-Altitude Aircraft and the Stratosphere (JPRS-65171) 8 Jul. 1975 p 6-15 Transl. into ENGLISH from the book "Vysotnyye Samolety i Stratosfera" Moscow, Gidrometeoizdat, 1974 (For availability see N75-27590 18-45)

Chemical and photochemical reactions in the stratosphere are discussed in terms of interrelated cycles. These are: (1) photodissociation and recombination of molecular oxygen and ozone; (2) nitrogen cycle; (3) hydrogen cycle; (4) reactions between nitrogen and hydrogen cycles; and (5) oxidation of hydrogen sulfide and sulfur oxide. It is concluded that nitrogen oxide exerts a strong influence on the destruction of ozone in the lower stratosphere, and hydrogen oxides exert a strong influence in the upper stratosphere. F.O.S.

N75-27593 Joint Publications Research Service, Arlington, Va.
GLOBAL DISTRIBUTIONS OF OZONE CONTENT AND SOME SMALL IMPURITIES IN THE STRATOSPHERE
I. L. Karol *In its* High-Altitude Aircraft and the Stratosphere (JPRS-65171) 8 Jul. 1975 p 16-24 Transl. into ENGLISH from the book "Vysotnyye Samolety i Stratosfera" Moscow, Gidrometeoizdat, 1974 (For availability see N75-27590 18-45)

The zonal distributions of stratospheric ozone density, and photochemically active impurities are discussed. Isopleths of the mean zonal and monthly ozone content are included along with

the meredional distribution of the mean zonal ozone density. Vertical profiles for the concentrations of nitrogen oxides are presented, and the concentrations of aerosols are discussed. F.O.S.

N75-27594 Joint Publications Research Service, Arlington, Va.
GLOBAL TRANSPORT OF IMPURITIES IN THE STRATOSPHERE
I. L. Karol *In its* High-Altitude Aircraft and the Stratosphere (JPRS-65171) 8 Jul. 1975 p 24-32 Transl. into ENGLISH from the book "Vysotnyye Samolety i Stratosfera" Moscow, Gidrometeoizdat, 1974 (For availability see N75-27590 18-45)

The zonal circulation of the stratosphere is discussed in terms of impurity transport. The distribution of impurities is shown to be homogeneous, and the slope of the direction of the macroturbulent transport is shown to be approximately identical to the mean position of the tropopause. The macroturbulent transfer of ozone is also discussed. F.O.S.

N75-27595 Joint Publications Research Service, Arlington, Va.
EFFECT OF DISCHARGES FROM ENGINES OF HIGH-ALTITUDE AIRCRAFT ON GASES AND AEROSOLS
I. L. Karol *In its* High-Altitude Aircraft and the Stratosphere (JPRS-65171) 8 Jul. 1975 p 32-42 Transl. into ENGLISH from the book "Vysotnyye Samolety i Stratosfera" Moscow, Gidrometeoizdat, 1974 (For availability see N75-27590 18-45)

The stratospheric propagation of combustion products from turbojet engines is discussed along with the effect of nitrogen oxides on ozone. F.O.S.

N75-27596 Joint Publications Research Service, Arlington, Va.
POSSIBLE INFLUENCE OF CHANGE IN OZONE AND AEROSOL CONTENT IN THE STRATOSPHERE ON CLIMATE AND THE BIOSPHERE
I. L. Karol *In its* High-Altitude Aircraft and the Stratosphere (JPRS-65171) 8 Jul. 1975 p 42-48 Transl. into ENGLISH from the book "Vysotnyye Samolety i Stratosfera" Moscow, Gidrometeoizdat, 1974 (For availability see N75-27590 18-45)

The absorption of solar radiation by ozone, and the climatological effects of a decrease in ozone content in the stratosphere are discussed along with the effects of an increase of aerosols. The effects on the biosphere of an increase in solar UV radiation are considered. F.O.S.

N75-27597# Trinity Univ., San Antonio, Tex. Dept. of Biology.
AN ECOLOGICAL APPROACH TO THE PROBLEM OF BIOGRADATION PHENOLIC WASTES
Howell D. Cobb, Robert Atherton, and William Olive 1 Jul. 1974 84 p refs
(Grant AF-AFOSR-2356-72; AF Proj. 9777)
(AD-A004517; AFOSR-75-0070TR) Avail: NTIS CSCL 06/13

Nineteen new strains of bacteria capable of degrading cresol have been isolated and characterized. All are capable of simultaneous metabolism of all three isomers of cresol at concentrations of 900 ppm. Four of the most promising organisms have been subjected to physiological studies to determine optimal and extremes of sewage activity. The following can be stated: (1) Optimal pH 7.3 to 8.3, optimal temperature 35 degrees Centigrade with some activity at 45 degrees Centigrade, have ability to survive short periods of cresol starvation and upon re-exposure again metabolize cresol as may be seen in field conditions. (2) At least one strain can thrive on cresol concentration of 1450 ppm which is three times greater than any published reports. (3) All strains appear able to metabolize o-dichlorobenze, a toxic compound and a problem in treatment of industrial wastes. GRA

N75-27598# Texas A&M Research Foundation, College Station.
THE EFFECTS OF CURRENTS AND WAVES ON AN OIL SLICK RETAINED BY A BARRIER Final Report
L. A. Hale, D. J. Norton, and C. A. Rodenberger Apr. 1974 309 p refs
(Contract DOT-CG-23357-A)
(AD-A004675; USCG-D-53-75) Avail: NTIS CSCL 13/2

The report presents the results of experimental studies conducted on the behavior of a floating oil slick subjected to various external mechanical influences and to the action of currents and waves. Specifically, studies were made of the behavior of a thick slick, retained by a barrier, subjected to currents and waves, and subjected to the influence of various slick shield devices. Studies were also made of the effects on a moving thin slick of energy absorbing barriers and various other slick control devices. The laboratory experiments closely duplicated prototype conditions except for wave size. The results of this investigation clarify many previous misconceptions of thick slick behavior and introduce several new concepts of slick behavior including a mathematical model describing the entrainment loss phenomena. Oil diversion schemes, rapid removal schemes and energy absorption barriers were evaluated in terms of their effect on thin slick behavior at high current velocities. GRA

N75-27599# Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
EVALUATION OF THE STRENGTH AND SEAKEEPING ABILITY OF POLLUTION CONTROL BARRIERS Final Report
Jerome H. Milgram and John F. ODea Sep. 1974 206 p refs
(Contract DOT-CG-12937-A)
(AD-A004674; USCG-D-55-75) Avail: NTIS CSCL 13/2

The purpose of the work described by the report is to provide a basis for the evaluation of arbitrary oil pollution control barriers without the need for full scale testing. It is described that for well designed barriers the principal cause of oil leakage is droplet entrainment which has little, if anything, to do with the barrier, but rather depends on how the barrier is used. Since the leakage from droplet entrainment cannot be quantitatively predicted at this time and is only slightly dependent on barrier design, a barrier is best evaluated on its strength and seakeeping ability. A barrier is adequate for the task intended if it is strong enough and follows the seas well enough for it to provide a surface-piercing curtain with adaquate draft and freeboard. The report gives means for making these evaluations. These are substantiated with full scale, model and analytical results. GRA

N75-27600# Environmental Protection Agency, Research Triangle Park, N.C. Office of Air Quality Planning and Standards.
GUIDELINES FOR AIR QUALITY MAINTENANCE PLANNING AND ANALYSIS. VOLUME 1: DESIGNATION OF AIR QUALITY MAINTENANCE AREAS
Sep. 1974 110 p refs
(PB-239663/8; EPA-450/4-74-001-Vol-1) Avail: NTIS HC $5.25 CSCL 13B

These guidelines are to assist the states in identifying and proposing air quality maintenance areas (AQMAs). They contain criteria which the states may use in designating such areas. If the states fail to designate such areas within the timetable specified by EPA regulations, EPA will use the criteria developed in the guidelines to establish AQMAs. GRA

N75-27601# Texas Univ., Austin. Div. of Natural Resources and Environment.
ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT. EXAMPLE APPLICATION 1: IMPLICATIONS OF ALTERNATIVE PUBLIC DECISIONS CONCERNING GROWTH AND ENVIRONMENT ON COASTAL ELECTRIC UTILITIES Final Report, 1 Jun. 1972 - 31 May 1974
Joe C. Moseley 31 May 1974 231 p refs
(Grant NSF GI-34870)
(PB-239821/2; NSF/RA/E-74-013) Avail: NTIS HC $7.50 CSCL 13B

The findings of a project to develop a methodology for assessing the implications of alternative public policies concerning growth and environmental control in electric power production are presented, including a feasibility demonstration on a real-world problem. This effort simultaneously examined three alternative growth policies and three alternative cooling policies in the Corpus Christi area. The growth policies range from zero population growth to an extrapolation of past trends. Various cooling techniques are applied to meet environmental criteria, which ranged from continuation of present practice to zero-discharge, while satisfying electrical demand for the three growth levels. The implications of these alternative futures upon natural resource

requirements, costs, and possible socio-economic impacts are displayed and assessed. GRA

N75-27602# Stanford Research Inst., Menlo Park, Calif.
A MANAGEMENT ASSISTANCE STUDY FOR THE ENVIRONMENTAL PROTECTION BRANCH OF THE MICHIGAN DEPARTMENT OF NATURAL RESOURCES Final Report
David Ackerman, Don Jacobs, Cliff Steward, Ward Stoneman, and Leo Weisbecker Dec. 1974 106 p
(Contract EPA-68-01-1564)
(PB-241017/3; EPA-905/9-74-019) Avail: NTIS HC $5.25 CSCL 13B

The Federal Government sponsored a study to assist the State of Michigan in a review of its newly established Environmental Protection Branch of the Department of Natural Resources; the impact of the new branch on interstate agencies and the private sector; the impact of the new branch on intrastate agencies and the private sector; and the new branch's staffing requirements as these factors affect the State's environmental protection goals. GRA

N75-27603# Southern Research Inst., Birmingham, Ala.
SYMPOSIUM ON ELECTROSTATIC PRECIPITATORS FOR THE CONTROL OF FINE PARTICLES
Charles E. Feazel + Jan. 1975 491 p refs Conf. held at Birmingham, Ala., 30 Sep. - 2 Oct. 1974; sponsored jointly by EPA and Southern Research Inst.
(Contract EPA-68-02-1308)
(PB-240440/8; SORI-EAS-75-056; EPA-650/2-75-016) Avail: NTIS HC $12.00 CSCL 13B

Several papers are presented which describe advances in electrostatic precipitator (ESP) technology, especially in the control of fine particles (those less than 1-2 micrometers in diameter) in industrial emissions. Data such as fractional collection efficiency measurements are presented that can be used to help define the capability of ESPs for the control of fine particles. Techniques for the sizing and design of ESPs, including a theoretically based mathematical model of ESP performance, and the selection of power supplies to improve performance and reliability are discussed. Methods for combatting the problem of collecting high-resistivity fly ash from the combustion of low-sulfur coal that are described include the operation of ESPs at both lower and higher than usual flue-gas temperatures, and the conditioning of fly ash by injection of sulfur trioxide, ammonia, or sulfamic acid into the flue gas. GRA

N75-27604# Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
LAND AND WATER RESEARCH Annual Report, 1974
Dec. 1974 43 p
(PB-240976/1; PSU-Information-73; OWRT-A-999-PA(3)) Avail: NTIS HC $3.75 CSCL 13B

This publication highlights activities of the Water Resources Research Center, the Land Resources Research Center, and the Regional Analysis Center in research and involvement in public affairs. Numerous lines of research are reported with concentrations in such areas as: water pollution control; renovation of waste water; management of watersheds; control of aquatic plant growth; development of water supply and waste water systems to meet regional needs; the economic impact of highways; land use planning; social impact of water reservoir development; biological and engineering studies of land and water resources; economic efficiency studies; acid mine water neutralization; soil productivity; roadside ecology; and solid waste disposal. GRA

N75-27605# National Academy of Sciences - National Research Council, Washington, D.C.
ASSESSING POTENTIAL OCEAN POLLUTANTS
Jan. 1975 456 p refs Supported in part by Dept. of Commerce and NSF
(PB-240917/5; ISBN-0-309-02325-4; LC-74-26299) Avail: NTIS MF $2.25; HC available from Natl. Acad. of Sci., 2101 Constitution Ave., Washington, D. C. 20418 CSCL 13B

The report is the result of a study to find ways for predicting which materials might have an undesirable effect environmentally or jeopardize future ocean resources. It describes general methods for screening pollutants according to production rate, environmental persistence, toxicity, and bioaccumulation. It then presents case studies that assess the potential effects of transuranic elements, synthetic organic chemicals, metallic wastes, medicinal wastes, and marine litter. GRA

N75-27606# Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
ENVIRONMENTAL RESPONSES TO THERMAL DISCHARGES FROM THE INDIAN RIVER STATION, INDIAN RIVER, DELAWARE
Loren D. Jensen Nov. 1974 220 p refs Sponsored by the Electric Power Research Institute
(PB-240756/7; EPRI-74-049-00-4; Rept-12) Avail: NTIS HC $7.25 CSCL 13B

The studies involved a detailed examination of water quality and nutrients in addition to temperature in the Indian River estuary. Fisheries data were collected in the Indian River to study the normal distribution of adult and juvenile fishes of both resident and migratory species. Studies on the species composition of the benthic invertebrates were conducted. Planktonic investigations involved population studies in the estuary and were augmented by entrainment studies of passing microscopic organisms through the condenser system of the power station. An estuary, such as the Indian River, is a complex and productive ecosystem supporting a rich assembly of organisms. GRA

N75-27607# Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
HEAT EXCHANGE AND TRANSPORT IN THE ENVIRONMENT Progress Report
John E. Edinger, Derek K. Brady, and John C. Geyer Nov. 1974 139 p refs Sponsored by Electric Power Res. Inst.
(PB-240757/5; EPRI-74-049-00-3; PR-14) Avail: NTIS HC $5.75 CSCL 13B

Man's thermal discharges are discussed in the context of earth's overall heat balance. Field data from about twenty lakes, rivers and estuaries are analyzed to demonstrate the validity of a simplified and refined theory of surface heat exchange that combines the heat dissipation roles of evaporation, conduction and back radiation into a single exchange coefficient. The equilibrium temperature concept is used to permit excess temperatures due to thermal discharges to be identified and analyzed. Various theoretical and empirical formulations for thermal plume shapes and trajectories are analyzed and summarized. GRA

N75-27608# Council on Environmental Quality, Washington, D.C.
THE ECONOMIC IMPACT OF ENVIRONMENTAL PROGRAMS Summary Report, Nov. - Dec. 1974
Dec. 1974 30 p refs
(PB-239773/5) Avail: NTIS HC $3.75 CSCL 13B

The memorandum summarizes the Council's 1974 estimates and analyses. It includes (1) abatement costs for 1973-1982; (2) macroeconomic impacts of environmental expenditures on: inflation; investment, productivity, and economic growth; employment; government finances; foreign trade; and distribution of income; and (3) impacts on specific industries. GRA

N75-27609# Center for California Public Affairs, Claremont.
CALIFORNIA ENVIRONMENTAL QUALITY ACT: INNOVATION IN STATE AND LOCAL DECISION MAKING Final Report
Thaddeus C. Trzyna and Arthur W. Jokela Oct. 1974 132 p refs
(Contract EPA-68-01-1818)
(PB-240125/5; EPA-600/5-74-023) Avail: NTIS; SOD HC CSCL 13B

The development and current status of California's environmental impact assessment program is described. The greatest impact is on private projects permitted by cities and counties. In many localities, environmental impact reports clearly influence decisions on such permits. Based on California's experience, some general recommendations are made for other States considering adopting similar requirements. GRA

N75-27610# California Univ., Berkeley. Sanitary Engineering Research Lab.
THE SIGNIFICANCE AND CONTROL OF WASTEWATER

FLOATABLES IN COASTAL WATERS Ecological Research Series
Robert E. Selleck, Lloyd W. Bracewell, and Ralf Carter Jan. 1974 128 p refs
(Grant EPA-R-800373)
(PB-239938/4; EPA-660/3-74-016) Avail: NTIS HC $5.75 CSCL 13B

Significance of flotage derived from submerged primary effluent plumes in the Southern California Bight is evaluated in terms of three components: particulates greater than or = 0.5 mm in size, particulates less than or = 0.1 mm in size, and surface film materials. The sampling methods utilized to collect the flotage from the surface are described in detail. The surface film and micro-particulates were captured by fabric screen samplers. It was found that the large particulates penetrated the ocean thermocline and gathered on the surface in profusion. The grease and wax portions of the particulates could be measured reliably with hexane extraction, with the mass of HEM of sewage origin being in the order of a metric ton on the water surface within the study area. GRA

N75-27611# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
CLOSED LOOP CONTROL OF INTERNAL COMBUSTION ENGINE EXHAUST EMISSIONS Final Report
J. David Powell and Mont Hubbard Feb. 1974 68 p refs
(Contract DOT-OS-30111)
(PB-239850/1; DOT-TST-75-62) Avail: NTIS HC $4.25 CSCL 21E

Several sensors used in the exhaust system for measurements of the fuel-air ratios are investigated along with closed-loop control techniques for maintaining accuracies of the fuel-air ratio. A zirconia device which measures oxygen in the exhaust was found to have the most desirable properties from a control standpoint and was used in the fuel-air ratio controllers. A laboratory engine was equipped with a fuel injector and used to perform studies on the closed-loop controller. It was found that fuel-air ratio accuracies of 1% or less were readily achievable in the presence of conceivable disturbances. GRA

N75-27612# Air Products and Chemicals, Inc., Marcus Hook, Pa. Houdry Div.
ENGINEERING AND COST STUDY OF AIR POLLUTION CONTROL FOR THE PETROCHEMICAL INDUSTRY, VOLUME 3: ETHYLENE DICHLORIDE MANUFACTURE BY OXYCHLORINATION Final Report
W. A. Schwartz, F. G. Higgins, Jr., J. A. Lee, R. Newirth, and J. W. Pervier Nov. 1974 104 p refs
(Contract EPA-68-02-0255)
(PB-240492; EPA-450/3-73-006-C-Vol-3) Avail: NTIS CSCL 07A

The manufacture of ethylene dichloride by oxychlorination is studied, including process and industry description, and engineering description of available emission control systems, the system costs, and the finanical impact of emission control on the industry. Suggested air episode procedures and plant inspection procedures are also presented. Author (GRA)

N75-27613# Kansas Univ., Lawrence. Kansas Water Resources Research Inst.
LIVESTOCK MANURE DISPOSAL VIA HYDROGASIFICATION Project Completion Report
Harold F. Rosson Dec. 1974 138 p refs Sponsored by Dept. of Interior
(PB-239960; Contrib-155) Avail: NTIS CSCL 07A

Manure as a source of carbonaceous materials is studied, along with its hydrogasification for solving feedlot water pollution. Manure can be hydrogasified to produce a mixture of low sulfur gases containing water, hydrogen, methane, ethane, and carbon dioxide. The yield of hydrocarbon gases in batch reactions is dependent on the reaction temperature and the hydrogen feed to carbon ratio with higher values producing higher yields. Water presence is beneficial to yield with an optimum initial water content in the manure of about 50%. When using a molten carbonate salt reaction medium, the optimum initial water content may be slightly smaller. Hydrogasification thermic yield is defined to be the heating value of the dry product gases minus the heating value of the hydrogen feed per unit mass of manure. Author (GRA)

N75-27614# Environmental Protection Agency, Washington, D.C.
ACTIVITIES OF FEDERAL AGENCIES CONCERNING SELECTED HIGH VOLUME CHEMICALS Final Report
Feb. 1975 39 p refs
(PB-240133; EPA-560/4-75-001) Avail: NTIS CSCL 07A

The nature and extent of many of the research and regulatory activities of the Environmental Protection Agency and other Federal agencies directed toward fifty high volume chemicals are summarized. It also discusses the regulatory authorities which are being or could be used to control these chemicals. Twenty-three charts are appended indicating the various activities directed toward these chemicals. Author (GRA)

N75-27615# National Environmental Research Center, Las Vegas, Nev.
ENVIRONMENTAL RADIOACTIVITY LABORATORY INTERCOMPARISON STUDIES PROGRAM, 1973 - 1974 Environmental Monitoring Series
Feb. 1974 27 p
(PB-240962/1; EPA-680/4-73-001-b) Avail: NTIS; SOD HC CSCL 18B

The U.S. Environmental Protection Agency's intercomparison studies program for laboratories involved in environmental radiation measurements is described. The types of environmental samples distributed, the analysis required for each sample, the distribution schedule, and the statistical analysis and reporting of results are discussed. Instructions and application forms are included for laboratories desiring to participate in the program. This document is not a research report. It is designed for use by laboratories participating or desiring to participate in this quality assurance program. GRA

N75-27616# National Environmental Research Center, Las Vegas, Nev.
RADIOACTIVITY STANDARDS DISTRIBUTION PROGRAM, 1973 - 1974 Environmental Monitoring Series
Feb. 1974 21 p
(PB-240955/5; EPA-680/4-73-001-A) Avail: NTIS HC $3.25 CSCL 18B

A program for the distribution of calibrated radioactive samples is described. Included is a discussion of the objectives of the distribution program and a description of the preparation, availability, and distribution of calibrated radioactive samples. Instructions and application forms are included for laboratories desiring to participate in the program. This document is not a research report. It is designed for use by personnel of laboratories participating or desiring to participate in the Radioactivity Standards Distribution Program which is a part of the U.S. Environmental Protection Agency's quality assurance program. GRA

N75-27617# National Bureau of Standards, Boulder, Colo.
SULPHUR DIOXIDE REFERENCE MATERIALS Final Report
J. K. Taylor and E. R. Deardorff Feb. 1975 17 p refs Sponsored by EPA
(COM-75-10420/8; NBSIR-75-662) Avail: NTIS HC $3.25 CSCL 14B

The development of reference materials to serve for quality control and performance evaluation of measurements of sulfur dioxide by the pararosaniline method is described. Powder samples consisting of sodium sulfite dispersed in mannitol can be prepared to evaluate measurements for the concentration levels of ambient interest. The samples are sufficiently stable in routine use, with a service life of at least three months. By the use of a series of five samples of graded sulfite content, measurement errors greater than five percent are significantly detected. A detailed procedure for preparation of the samples is included. Preliminary studies of an alternate method for preparation of quality control samples, by a freeze-drying process are also described. GRA

N75-27618# NATO Committee on the Challenges of Modern Society, Brussels (Belgium).
AIR POLLUTION: CONFERENCE ON LOW POLLUTION POWER SYSTEMS DEVELOPMENT

Feb. 1974 346 p Conf. held at Eindhoven, Netherlands, 23-25 Feb. 1971 Sponsored by EPA
(PB-240564/5; NATO/CCMS-4) Avail: NTIS HC $9.50 CSCL 13B

Papers given at a conference are presented. Topics discussed include federal motor vehicle emission goals for CO, HC, and NOx based on desired air quality levels, advance automotive power systems program, potential of the gas turbine vehicle in alleviating air pollution, the Stirling-cycle engine, Rankine-cycle power system with organic-based fluid and reciprocating expander for low emission automotive propulsion, nitrogen oxide formation in the combustion chamber of the internal combustion engine and its suppression by measures from combustion technology, low emissions from controlled combustion for automotive Rankine cycle engines, hybrid heat engine/electric systems, advanced techniques in electrical vehicles, lithium-sulfur batteries, electric cars, and electrical vehicles with fuel cells. M.J.S.

N75-27619# General Electric Co., Cincinnati, Ohio.
DEVELOPMENT OF LOW EMISSION POROUS PLATE COMBUSTOR FOR AUTOMOTIVE GAS TURBINE AND RANKINE CYCLE ENGINES
Richard J. Rossbach Sep. 1973 255 p
(Contract EPA-68-01-0461)
(PB-240776/5; EPA-460/3-73-001) Avail: NTIS HC $8.50 CSCL 21G

The porous plate combustor was evaluated for use in the gas turbine or Rankine cycle advanced automobile engines to control exhaust emissions. Analytical results concerning the gas turbine engine include the burner area requirements for the various operating conditions of the baseline engine as well as exhaust emission predictions. The design concept of an air-cooled, variable area combustor for this engine is presented. Operational and emissions data on several experimental combustors are presented along with the fabrication development leading to these combustors. Finally the demonstration results for a full-scale fuel-air mixture system are presented. GRA

N75-27620# General Electric Co., Schenectady, N.Y.
COMPACT SAMPLING SYSTEM FOR COLLECTION OF PARTICULATES FROM STATIONARY SOURCES Final Report
Carl G. Ringwall Apr. 1974 108 p refs
(Contract EPA-68-02-0546)
(PB-240398/8; EPA-650/2-74-029) Avail: NTIS HC $5.25 CSCL 20D

Work performed on a program to design, fabricate, and evaluate a controller for automatically sensing and maintaining isokinetic conditions at the inlet of a particulate sampling nozzle is summarized. The key components developed on the program were the gas velocity sensor and a fluidic control amplifier. The sensor concept is based on a static pressure differential between the free air stream and the nozzle inlet. Field tests were performed on the engineering prototype system at both oil-fired and coal-fired power plant installations. Results of these tests showed that the sensor and controller can function with no degradation in performance under the adverse environment of representative power plant stacks. GRA

N75-27621# Institute for Defense Analyses, Arlington, Va. Science and Technology Div.
EFFECT OF ATMOSPHERIC NUCLEAR EXPLOSIONS ON TOTAL OZONE Final Report
Ernest Bauer and Forrest R. Gilmore Jan. 1975 42 p refs
(Contract DOT-OS-30057)
(PB-240747/6; DOT-TST-75-67) Avail: NTIS HC $3.75 CSCL 18C

Current empirical knowledge of the depletion of stratospheric ozone due to the injection of oxides of nitrogen from thermonuclear explosions in the atmosphere is reviewed, including both the ground-based observations of global ozone after the 1961-62 multimegaton test series, and also the satellite observations of local effects following an individual French thermonuclear explosion in 1970. There is general agreement on the NO production per megaton yield, and on the subsequent ozone depletion expected to be associated with the various nuclear tests. The latter depletion is small--typically of the order of several percent during a reasonable observation interval--and lies within the probable error of available ozone measurements. Existing atmospheric data do not provide a statistically significant demonstration of the cyclic destruction of ozone by oxides of nitrogen. GRA

N75-27622# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
TRANSIENT THREE DIMENSIONAL MODELING OF TEMPERATURE DISTRIBUTIONS IN RIVERS WITH AND WITHOUT THERMAL DISCHARGES M.S. Thesis
Richard Guy Hills May 1974 146 p refs
(PB-240521/5; OWRT-A-029-IND(6); W75-05786) Avail: NTIS HC $5.75 CSCL 08H

The effects of thermal discharges and various meteorological conditions and channel parameters on the thermal structure in water are analyzed and discussed. The model considers the diurnal cycle in which the incoming solar and atmospheric radiation are functions of time. The reflection from the air-water interface and the bottom of the channel are accounted for. Since the interaction of solar radiation with water is not a surface but a volume phenomenon, internal absorption and scattering of radiation are considered, and the volumetric solar heating is determined. The effects of thermal stratification on turbulence are included in the model. GRA

N75-27623# Chicago Univ., Ill. Center for Urban Studies.
ENVIRONMENTAL REGULATIONS AND URBAN TRAFFIC
Kevin G. Croke (Argonne Natl. Lab.) and Richard Zerbe 1974 14 p Prepared jointly with Argonne Natl. Lab.
(Grants NSF AG-352; NSF GI-3298A2)
(PB-240697/3; NSF/RA/E-74-028) Avail: NTIS HC $3.25 CSCL 13B

The study considers four broad categories of emission control programs: Federal Emission Standards; local emission control for vehicles; traffic flow improvements; and mass transit incentives. Local automotive pollution control options are analyzed and compared in terms of their cost and their emission reductions in a sample urban area. The Chicago metropolitan is the sample region selected for the study. GRA

N75-27624# California Univ., Santa Barbara. Marine Science Inst.
OIL SPILL AND OIL POLLUTION REPORTS, JULY - OCTOBER 1974
Floyd A. DeWitt, Jr. and Penelope Melvin Mar. 1975 218 p refs
(Contract EPA-R-803063)
(PB-240719/5; EPA-670/2-75-003) Avail: NTIS; SOD HC CSCL 13B

The July 1974 and October 1974 Oil Spill and Oil Pollution Reports is the first Quarterly compilation of oil spill events and oil pollution report summaries. Presented in the report are: (a) summaries of oil spill events, (b) summaries and bibliographic literature citations, (c) summaries of current research projects, and (d) patent summaries. GRA

N75-27625# Bureau of Mines, Pittsburgh, Pa. Mining and Safety Research Center.
METHANE ANALYZER SYSTEM TO RECORD CONTINUOUSLY THE METHANE CONTENT OF COAL MINE VENTILATION AIR
M. C. Irani, P. W. Jeran, and D. H. Lawhead Feb. 1975 19 p
(PB-240671/8; BM-RI-8009) Avail: NTIS HC $3.25 CSCL 07D

The Bureau of Mines, in cooperation with the Mine Safety Appliances Co., has developed a new methane analyzer system for underground applications. The system was installed and operated in an active mine in the Pittsburgh coalbed. The system and details of its installation and calibration are described. Data are presented to substantiate its reliability. GRA

N75-27626# Exxon Research and Engineering Co., Linden, N.J.
EVALUATION OF POLLUTION CONTROL IN FOSSIL FUEL CONVERSION PROCESSES. LIQUEFACTION, SECTION 1: COED PROCESS Final Report
C. D. Kalfadelis and E. M. Magee Jan. 1975 12 p refs
(PB-240371/5; GRU-7DJ-75; EPA-650/2-74-009) Avail: NTIS HC $4.25 CSCL 07A

The COED coal conversion process was reviewed in terms of its effect on the environment. Estimates of solid, liquid, and gaseous effluents are included as well as the thermal efficiency of the process. Process modifications are proposed and new technology needs, aimed at lessening adverse environmental impact, are indicated. Author

N75-27451 Joint Publications Research Service, Arlington, Va.
SPREAD OF INDUSTRIAL MOISTURE DISCHARGE IN THE ATMOSPHERE AND ITS EFFECT ON THE DISPERSION OF POLLUTANTS
M. Ye. Berlyand and V. B. Kiselev *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 1-16 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 3-15 (For availability see N75-27450 18-42)

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N75-27627 British Library Lending Div., Boston Spa (England).
VERTICAL PROFILES OF THE QUANTITATIVE CHARACTERISTICS OF THE FIELD OF SHORT WAVE RADIATION IN THE ATMOSPHERE
O. B. Vasilev, V. S. Griseckin, and K. Ja. Kondratev [1974] 19 p refs Transl. into ENGLISH from Tr. Gl. Geofiz. Observ. (Leningrad), v. 317, 1973 p 37-47 In ENGLISH and RUSSIAN
(BLL-M-23635-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.: 2 BLL photocopy coupons

Spectral measurements of upward and downward fluxes of short-wave radiation at different levels in the free atmosphere were obtained during the combined radiation experiment of 25/X/70 in the Complex Energetics Experiment - 70 as an IL-18 flying laboratory made a rapid descent at noon. A detailed description is presented of the apparatus used and of the observation methods and the results obtained. These results are used to determine the vertical profiles of the different quantitative characteristics of the field of short-wave radiation in a clear sky (total radiation current, the albedo of the earth-atmosphere system, the incoming flux of radiant heat, etc). Author

N75-27628 Wisconsin Univ., Madison.
THE REMOTE DETERMINATION OF AEROSOL SIZE DISTRIBUTIONS FROM AIRBORNE MEASUREMENT OF THE SOLAR AUREOLE Ph.D. Thesis
Jerold Thomas Twitty 1974 157 p
Avail: Univ. Microfilms Order No. 75-10008

Determination of in situ aerosol size distributions were made using an airborne aureole sensor. This instrument, consisting of a collimator and large dynamic range photodetector amplifier system, scans about the vertical, recording both the direct attenuated solar beam and diffuse sky radiance in the almucantar of the sun at an effective wavelength of 0.54 micrometers. The determination of aerosol size distributions from the angular distribution of the radiance scattered from aerosols was investigated using simulated data. The method was found to be adequate for the determination of aerosol sizes from approximately 0.2 micrometers radius to 8.0 micrometers. Data taken during a flight experiment was analyzed to yield aerosol size distributions. Comparison with distributions obtained with an impactor and with other typical tropospheric aerosol size distributions are presented. Conclusions about the aerosols were inferred by coupling the size distribution results with the results of other instrumentation. Dissert. Abst.

N75-27629# Eidgenossische Technische Hochschule, Zurich (Switzerland).
THE POTENTIAL PROBLEM WITH APPLICATION TO GEOELECTRICS Ph.D. Thesis [SUR UN PROBLEME DE POTENTIEL ET SON APPLICATION A LA GEOELECTRIQUE]
Hubert Guillelmon 1973 131 p refs In FRENCH
(Rept-5024) Avail: NTIS HC $5.75

Attempts made to improve and generalize results of resistivity measurements of inclined surfaces are reported. Special attention was given to the case of the surface of the earth as constituted by two homogeneous terrains and isotopes having different resistivities, and in contact on an inclined half plane. Methods used to study the problem-integral equations, direct analog interpretation, and indirect empirical interpretation are outlined. Mathematical models developed for the study are included.
Transl. by E.H.W.

N75-27630# Physical Research Lab., Ahmedabad (India).
BLANKETING SPORADIC E LAYER NEAR THE MAGNETIC EQUATOR
H. Chandra and R. G. Rastogi [1975] 6 p refs Prepared in cooperation with Indian Institute of Astrophysics.
(AER-75-02) Avail: NTIS HC $3.25

A study of the ionograms obtained at Kodaikanal (dip lat.1.7 N) during the period 1954-66 shows that the daily variation of the occurrence of blanketing type of Es (Es-b) has a major peak around 1700 LT in the evening and a minor peak around 0800 LT in the morning, and is practically inhibited around midday hours when the electrojet currents are maximum. Es-b is most frequent during local summer months and in the years of minimum solar activity. In individual cases, Es-b occurs during the period of very weak or reversed electrojet currents, and the ionospheric drifts during these occasions show predominantly a north to south component. It is suggested that the equatorial Es-b is due to the transport and accumulation of long-lived metallic ibns from tropical latitudes to the magnetic equator by equatorward winds, during the period when the electrojet currents are very weak and thus the upward Hall polarization field is absent.
Author

N75-27631# Texas A&M Univ., College Station.
UNITED STATES AIR FORCE SOIL STABILIZATION INDEX SYSTEM; A VALIDATION Final Report, Jan. 1971 - Jun. 1974
Wayne A. Dunlap, Jon A. Epps, B. R. Biswass, and Bob M. Gallaway Jan. 1975 307 p refs
(Contract F29601-70-C-0008)
(AD-A004876; AFWL-TR-73-150) Avail: NTIS CSCL 13/2

The report covers the validation of a soil stabilization index system which was developed earlier. The index system was originated to aid military engineers in selecting the appropriate type and amount of soil stabilizer to use in pavement construction. A comprehensive review of literature in the soil stabilization field was used to initially develop the index system. Laboratory tests and discussions with experts in soil stabilization were used in the validation phase reported herein. Based on these tests and discussions, several changes have been made to the initial index system, although the original concept has not been altered. The index system is entered with easily determined soil properties and flow charts are followed to arrive at the most suitable stabilizer. Subsystems containing appropriate tests are used to determine specific amounts of stabilizers. Use factors, construction factors and environmental factors are also considered in the decision-making process. Recommendations are included for additional verification studies of the index system. GRA

N75-27632# Naval Research Lab., Washington, D.C.
AURORA: AN NRL AURORAL CHEMISTRY CODE
Ellis Hyman and Paul Julienne Jan. 1975 34 p refs
(NRL Proj. H02-35; DNA Proj. NWET-L25AAXH)
(AD-A004602; NRL-MR-2965) Avail: NTIS CSCL 04/1

A computer code is described which models the chemistry in the atmosphere during and subsequent to the deposition of auroral electrons. In addition to obtaining altitude profiles of 14 atmospheric species as a function of time for any given incident-electron spectrum, the code predicts volume and column emissions of selected UV, visible, and IR spectral lines. Typical results from an ICECAP spectrum are presented. GRA

N75-27633# Panametrics, Inc., Waltham, Mass.
SOLAR UV FLUXES AND OZONE OVERBURDENS OBTAINED FROM UVS MEASUREMENTS ON THE CIAP ROCKET PLUME FLIGHT OF 10 APRIL 1974, AND THE LACATE FLIGHTS OF 5 MAY 1974

Frederick A. Hanser and Bach Sellers Dec. 1974 21 p refs
(Contract N00014-73-C-0316)
(AD-A004224; PANA-UVS-5) Avail: NTIS CSCL 04/1

An ultraviolet interference-filter spectrophotometer (UVS) has been used to obtain solar UV fluxes and ozone overburdens at high altitude from several flights on a WB57F aircraft. The data from three DOT Climatic Impact Assessment Program flights have been reduced to final UV flux and ozone overburden values and the results are presented in this report. These flights were in support of missions associated with study of rocket plumes (10 April 1974), and the LACATE (Lower Atmospheric Composition and Temperature Experiment, 5 May 1974). GRA

N75-27634# Aerospace Corp., El Segundo, Calif.
INFRARED ATMOSPHERIC EFFECTS Interim Report
C. M. Randall 6 Jan. 1975 37 p refs
(Contract F94701-74-C-0075)
(AD-A004832; TR-0075(9270-01)-5; SAMSO-TR-75-5) Avail: NTIS CSCL 04/1

The basic processes leading to the absorption, emission, and scattering of infrared radiation in the atmosphere below 70 km are briefly reviewed. The present ability to predict these effects is demonstrated by examples of computed infrared transmittance spectra obtained with low-resolution band model techniques and with high-resolution monochromatic techniques. Several examples are included of the experimental application of these techniques to the derivation of atmospheric composition and meteorological dat from infrared observations. GRA

N75-27635# Naval Research Lab., Washington, D.C.
AURORAL BIRKELAND CURRENTS AND ANOMALOUS RESISTANCE Interim Report
A. Fedder and J. H. Orens Jan. 1975 16 p refs
(NRL Proj. H02-35; DNA Proj. NWET-L25AAXH)
(AD-A004631; NRL-MR-2975) Avail: NTIS CSCL 04/1

Results are presented from an auroral arc model which illustrate the physical relationship between the auroral Birkeland currents and an assumed anomalous resistance along the geomagnetic field. It is shown that the distribution of the Birkeland current is very sensitive to the spatial form of the resistance function. It is also observed that for a variety of resistance functions the auroral field distribution remains essentially unchanged. GRA

N75-27636# RCA Corp., Cape Kennedy, Fla.
A PROPOSAL FOR LIGHTNING DETECTION AND LOCATION
Toxey A. Hall Jan. 1974 52 p refs Prepared in cooperation with DARPA, Arlington, Va.
(Contract F08606-73-C-0039)
(AD-A004847; RCA/TELTA/TR-73-043; AFETR-TR-75-02) Avail: NTIS CSCL 04/1

The objectives of the project are the following: Design, fabricate, and test a lightning azimuth sensor based on the crossed loop principles; identify hardware and software requirements for real-time computer processing of azimuth data from two or more sensors; design communication system interim for two station system evaluation; and, prepare system plans for full scale trial system with real-time processing and display. GRA

N75-27637# Lamont-Doherty Geological Observatory, Palisades, N.Y.
THEORY AND CALCULATION FOR DISPLACEMENTS AND STRESSES AT AN EARTHQUAKE SOURCE Semiannual Report
Paul G. Richards 30 Oct. 1974 83 p refs
(Contract F44620-74-C-0029; ARPA Order 1827-11)
(AD-A004827; AFOSR-75-0202TR; SAR-2) Avail: NTIS CSCL 08/11

The progress report describes the near-field motions of an earthquake source model which is governed by simple physical constraints in terms of dynamic friction on a fault plane. It also describes a computer program which will calculate the displacements radiated (into the near, intermediate, and far field) by any of a wide variety of earthquake fault motions. Several applications of the program are described. GRA

N75-27638# Cooperative Inst. for Research in Environmental Science, Boulder, Colo.
SEISMIC WAVE PROPAGATION AND EARTHQUAKE CHARACTERISTICS IN ASIA Final Report, 1 Apr. - 30 Sep. 1974
C. Kisslinger, E. R. Engdahl, G. Boucher, and R. Ganse 30 Oct. 1974 73 p refs
(Contract F44620-74-C-0015; ARPA Order 1827)
(AD-A003690; AFOSR-74-1909TR) Avail: NTIS CSCL 08/11

Contents: Effects of plate structure on the determination of earthquake focal mechanisms; A P travel-time residual study of the Hindu Kush Region; Long period body wave studies of Asian seismic events; Classification of Asian earthquakes. GRA

N75-27639# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
AURORAL ELECTROJET MAGNETIC ACTIVITY INDICES AE (11) FOR 1971
Joe Haskell Allen, Carl C. Abston, and Leslie D. Morris Feb. 1975 152 p
(COM-75-50250-39; NOAA-75030301; UAG-39) Avail: NTIS MF $2.25; HC available from National Climatic Center, Asheville, N. C. 28801. Attn: Publications CSCL 04A

The auroral electrojet index (AE) is discussed, and a brief description is given of the derivation of 11-station 2.5-min AE indices for 1971. Tables are given of hourly average indices for each day of the year, the stations making the main contribution to the hourly indices, and of the average monthly quiet-time level of horizontal fields (H) at each magnetic observatory. Graphs of the index variations are included for each day of 1971. GRA

N75-27640# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
GEOPHYSICAL MONITORING FOR CLIMATIC CHANGE, NO. 2, SUMMARY REPORT 1973
John M. Miller Dec. 1974 110 p refs
(COM-75-10354/9; NOAA-75022603) Avail: NTIS HC $5.25 CSCL 04A

Developments which occurred in 1973 in the Geophysical Monitoring for Climatic Change observatory network are described. The amount of data increased and this led to the design of centralized data handling methods to cope with the flood of information expected in 1974 and 1975. Major physical changes within the observatory network occurred with the completion of the total ozone observational dome at Point Barrow, preparatory design work for major additions to the South Pole program, and construction of a sampling tower at Samoa. Details of augmented programs are included such as measurement programs, flask sampling for freon and carbon tetrachloride, lidar system development, Aitken data collection, and solar radiation monitoring programs. The year saw staff assigned to 3 new observatories; acquisition and installation of new measurement programs; and establishment of initial support facilities and staff for data quality control and processing and for analyses. GRA

N75-27641# Teledyne Geotechnical, Alexandria, Va. Seismic Data Analysis Center.
A COMPARISON OF THE LASA-NORSAR SHORT PERIOD ARRAYS
A. C. Chang 12 Apr. 1974 52 p refs
(Contract F08606-74-C-0006; ARPA Order 1620)
(AD-A003484; SDAC-TR-74-5) Avail: NTIS CSCL 08/11

The study compares the LASA and NORSAR short-period arrays in terms of their detection processing systems and their event summaries, for data recorded during a period of 40 days from 15 February to 25 March 1972. An overview of the worldwide surveillance performance of the combined LASA-NORSAR systems is also given. GRA

N75-27177* National Bureau of Standards, Boulder, Colo.
APPLICATIONS OF PTTI TO NEW TECHNIQUES FOR DETERMINING CRUSTAL MOVEMENTS, POLAR MOTION, AND THE ROTATION OF THE EARTH
P. L. Bender (Colorado Univ., Boulder) *In* NASA. Goddard Space Flight Center Proc. of the Sixth Ann. Precise Time and Time Interval (PTTI) Planning Meeting 1974 p 39-57 refs
(For availability see N75-27173 18-31)
CSCL 08G

N75-27447 Joint Publications Research Service, Arlington, Va.
GLACIOLOGICAL-GEODETIC INVESTIGATIONS ON HAYS GLACIER IN 1972
Z. Meyer *In its* Soviet Antarctic Inform. Bull. (JPRS-64980) 11 Jun. 1975 p 15-19 refs Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 61-64 (For availability see N75-27444 18-42)

N75-27452 Joint Publications Research Service, Arlington, Va.
STATISTICAL ANALYSIS OF TRAVELING PLANETARY WAVES
M. I. Fortus *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 17-24 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 16-22 (For availability see N75-27450 18-42)

N75-27453 Joint Publications Research Service, Arlington, Va.
NUMERICAL EXPERIMENTS IN THE CALCULATION OF NONSTATIONARY GRAVITY WAVES IN THE FREE ATMOSPHERE
V. Z. Kiselnikova *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 25-33 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 23-30 (For availability see N75-27450 18-42)

N75-27454 Joint Publications Research Service, Arlington, Va.
EFFECT OF THE CURVATURE OF THE MOISTURE PROFILE ON THE INITIAL STAGE OF CELLULAR CONVECTION
A. P. Khain *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 34-44 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 31-38 (For availability see N75-27450 18-42)

N75-27455 Joint Publications Research Service, Arlington, Va.
DAY-TO-DAY VARIABILITY OF THE TOTAL OZONE CONTENT BY SEASONS AND SEA LEVEL PRESSURE
L. A. Uranova *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 45-54 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 39-46 (For availability see N75-27450 18-42)

N75-27464 Joint Publications Research Service, Arlington, Va.
ACCURACY OF MEASURING LONGWAVE RADIATION BY THE ACTINOMETRIC RADIOSONDE
G. N. Kostyanoy *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 133-140 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 105-109 (For availability see N75-27450 18-42)

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N75-27642 British Library Lending Div., Boston Spa (England).
ON THE MECHANISM OF OCEAN-ATMOSPHERE INTERACTION DURING A GALE
R. S. Bortkovskij [1974] 9 p refs Transl. into ENGLISH from Tr. Gl. Geofiz. Observ. (Leningrad), v. 282, 1972 p 187-193
(BLL-M-23536-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

The relationship of the coefficient of friction of the sea surface to wind speed and the stage of wave development which forms the basis of a methodology for calculating turbulent currents of heat, water vapor, and momentum is extended to include gale conditions as well as light to moderate winds. The role of spray torn from the crest of waves by the wind in the transfer of heat, water vapor, and momentum is considered. It is shown that the mass of wind torn spray increases sharply at just the speed at which a rapid rise in the exchange coefficients begins. J.M.S.

N75-27643 British Library Lending Div., Boston Spa (England).
ON THE STATISTICAL STRUCTURE OF SUMMER PRECIPITATION
A. I. Poliscuk [1974] 15 p refs Transl. into ENGLISH from Tr. Gl. Geofiz. Observ. (Leningrad), v. 286, 1972 p 39-54
(BLL-M-23541-(5828.4F)) Avail: British Library Lending Div., Boston Spa., Engl: 2 BLL photocopy coupons

The statistical structure of precipitation fields for large areas was studied to determine the accuracy of estimating the monthly mean layer of precipitation for various network densities. Precipitation correlation functions, and the relationship between the error and distance are discussed. F.O.S.

N75-27644 British Library Lending Div., Boston Spa (England).
ON THE SIZE DISTRIBUTION OF CLOUD DROPS IN A TURBULENT ATMOSPHERE
V. I. Smirnov and A. S. Kabanov [1974] 10 p refs Transl. into ENGLISH from Tr. Cent. Aerol. Obs. (Moscow), v. 101, 1972 p 3-12
(BLL-M-23548-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

The growth of a cloud drop by condensation in a turbulent stream is discussed. In the model described, the stream is considered an aggregate of mutually isolated volumes of the cloud aerosol. Equations for the drop size increase with height are given along with the diffusion equation for drop concentration. It is concluded that the drop size distribution for stochastic condensation are polydisperse when condensation levels are different. F.O.S.

N75-27645 British Library Lending Div., Boston Spa (England).
AN EXPERIMENT IN APPLYING DISCRIMINANT ANALYSIS FOR LONG-RANGE FORECAST OF PRECIPITATION
A. D. Mescerska, N. D. Popova, and Ju. V. Nikolaev [1974] 15 p refs Transl. into ENGLISH from Tr. Gl. Geofiz. Observ. (Leningrad), v. 273, 1972 p 29-39 In ENGLISH and RUSSIAN
(BLL-M-23531-(5828.4F)) Avail: British Library Lending Div., Boston Spa. Engl.: 2 BLL photocopy coupons

Statistical methods of long-range forecasting based on correlation analysis are discussed. The selection of predictors by discriminant analysis is described for forecasting precipitation in Moldavia and the Western Ukraine. The verification of the precipitation forecasts is considered to substantiate the reasonableness of the method. F.O.S.

N75-27646 British Library Lending Div., Boston Spa (England).
RADAR CRITERIA FOR HAIL DANGER, DEDUCED WITH THE HELP OF A 10 cm RADAR SYSTEM
K. Stantchev, R. Petrov, P. Boev, and L. Kostadinov [1974] 8 p refs Transl. into ENGLISH from Hidr. Met. 23 (SOFIA), no. 1, 1974 p 67-69
(BLL-M-23636-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

Radar hail criteria are used to estimate the hail-suppression danger of convective clouds. Observations obtained with a 3.2 cm and a 10 cm radar system are compared. The 10 cm system is considered to be more effective in selection of clouds amenable to artificial modification and in monitoring the evolution of the convective clouds. J.M.S.

N75-27647 Oklahoma Univ., Oklahoma City.
VARIATIONAL OPTIMIZATION ANALYSIS OF TEMPERATURE AND MOISTURE ADVECTION IN A SEVERE STORM ENVIRONMENT Ph.D. Thesis
Marshall Joe McFarland 1975 87 p
Avail: Univ. Microfilms Order No. 75-15266

Horizontal wind components, potential temperature, and mixing ratio fields associated with a severe storm environment in the south central U.S. were analyzed from synoptic upper air observations with a nonhomogeneous, anisotropic weighting function. The grid dimensions of the area of study were near 125 kilometers horizontally and 50 millibars vertically at 18 pressure levels. Each data field was filtered with variational optimization analysis techniques. For the data base of 26/1200Z May 1973, several major findings emerged. The dry intrusion is characterized by warm air, the advection of which produces a well defined upward motion pattern. A corresponding downward

motion pattern apparently comprising a deep vertical circulation in the warm air sector of the associated low pressure system was detected. Another major result was the alignment of the axes of maximum dry and warm advection with the axis of the tornado producing squall line that subsequently developed.
Dissert. Abstr.

N75-27648 Texas Univ., Dallas.
AN EVALUATION OF LIGHTNING AS A SOURCE OF SEVERE STORM INFRASOUND Ph.D. Thesis
William Harold Beasley 1974 266 p
Avail: Univ. Microfilms Order No. 75-13932

The suggestion that lightning is the cause of atmospheric infrasound emitted during severe convective storms was evaluated. Two possible sources of the emissions, low frequency components of thunder and electromechanical relaxation in the cloud after a lightning discharge, were studied. The results were inconclusive, however, because the infrasonic power spectrum of thunder and the amount of energy available from the electromechanical relaxation are poorly known. Based on the assumption that infrasound, if caused by lightning, ought to correlate in azimuth and time with electromagnetic emissions (sferics) from lightning, severe storm infrasound and sferics observations were conducted. Azimuth-time histories of infrasound and sferics arrivals did not correlate in many cases, indicating that the source of sferics is not the source of infrasound. Patterns in sferics and infrasound data also imply that infrasound generation occurs during the early stages of storm development when convection is most vigorous. Dissert. Abstr.

N75-27649 Texas A&M Univ., College Station.
EFFECT OF A TRANSIENT DENSITY ANOMALY ON A ROTATING WIND FIELD Ph.D. Thesis
Robert Edmund Eskridge 1974 104 p
Avail: Univ. Microfilms Order No. 75-15025

The physical and dynamical effects of simulated precipitation in a rotating wind field are examined by numerical experiment. The numerical model consists of the three equations of motion, a thermodynamic equation, a conservation equation for precipitation, a derived pressure equation, and appropriate boundary conditions, that are solved numerically by use of central space and time differences in a 1.84 km by 1.82 km grid. While no moisture and heat exchanges are included in the model, the effect of rain and hail is simulated through differing terminal velocities. The results of two experiments show that vorticity is concentrated by the precipitation induced, accelerating downdraft. The downdraft, which descends dry adiabatically, becomes warmer than the air outside of the downdraft because the lapse rate of potential temperature in the environmental air is only slightly less than most-adiabatic. Near the surface, the air in the downdraft attains sufficient positive buoyancy to overcome the negative buoyancy of the precipitation and begins to be accelerated upward. Dissert. Abstr.

N75-27650# Physical Research Lab., Ahmedabad (India).
WESTWARD IONOSPHERIC CURRENTS OVER THE DIP EQUATOR DURING GEOMAGNETIC DISTURBANCES
R. G. Rastogi [1975] 4 p refs Prepared in cooperation with Indian Institute of Astrophysics.
(AER-75-01) Avail: NTIS HC $3.25

During geomagnetic disturbed periods, the q type of sporadic E layer near the dip equator is shown to disappear with maximum error of five minutes during the period when the difference of the geomagnetic H field between the equatorial and non-equatorial station decreases below the night level. These periods are identified with the reversal to westward direction of the electrojet currents at the base of the E region around 100 km level irrespective of the changes in the Sq current system which might be produced by the disturbance. Author

N75-27651# Technische Hochschule, Darmstadt (West Germany).
THE SIMULATION OF RAINFALL DISTRIBUTION FOR FLOOD RUNOFF MODELS Ph.D. Thesis
Georg Euler 1974 161 p refs In GERMAN; ENGLISH summary
Avail: NTIS HC $6.25

The calculation of flood hydrographs from precipitation requires the estimation of effective rainfall parts for runoff (rainfall-separation) as well as the description of catchment behavior (runoff-concentration). A simple but reliable method for the calculation of effective and uneffective parts of rainfall was developed which can be used as a component of hydrological rainfall-runoff models. For this purpose rainfall was separated in one uneffective (only soil-moisture increasing) and three effective components. These effective rainfall components produce a quick surface runoff component (from well-draining areas near stream channels) and one slow component, as well as one discharge hydrograph resulting from rainfall which percolated through the soil as interflow to channels or to the ground-water level. To simulate rainfall-separation, system-specific maximum possible rate curves for losses and percolation were defined (which are valid beginning with individual initial parameters for natural precipitation events). Taking these rate curves and the priority list (losses, percolation, surface runoff) into consideration, a nonlinear and time-variant separation of rainfall was performed by continuous balancing. An analysis of parameter sensitivities and examples, in which the rainfall-separation model was combined with a parallel cascades model of linear storage, is included. Author

N75-27652*# Dayton Univ. Research Inst., Ohio.
FEASIBILITY OF MINIATURIZED INSTRUMENTATION OF THE INFLATABLE SPHERE FOR TEMPERATURE, PRESSURE AND ACCELERATION MEASUREMENT Final Report
James K. Luers Washington NASA Jul. 1975 31 p refs (Contract NAS6-2456)
(NASA-CR-2570) Avail: NTIS HC $3.75 CSCL 04A

The feasibility of instrumenting the inflatable passive sphere (presently used to provide upper atmosphere density measurements) with miniaturized thermistors, pressure transducers, and accelerometers was analyzed. Data from the sensors must be transmitted by an onboard telemetry system to a ground receiving station. To assure a sufficiently slow fall velocity for the sphere the additional mass of the sensor and telemetry hardware must be less than 100 grams. Other constraints that must be satisfied by the sensor and telemetry systems include the ability to withstand a 150 g launch acceleration, the ability to function in both high and low temperature and pressure environments and be sufficiently small to be packaged within the body of a 3.81 cm diameter dart. A differential transducer that will measure the difference between ambient and internal sphere pressures is recommended. The application of each type of measurement relative to its ability to monitor sphere malfunction and to provide additional meteorological data is considered. Author

N75-27653# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
INTEGRATING ACQUISITION OF ATMOSPHERIC PARAMETERS IN THE MICROTURBULENT RANGE [INTEGRIERENDE ERFASSUNG ATMOSPHAERISCHER ZUSTANDSGROESSEN IM MIKROTURBULENTEN BEREICH]
Hans Schroers Dec. 1974 64 p refs In GERMAN Sponsored by Duet. Forschungsgemeinschaft
(Mitt-20) Avail: NTIS HC $4.25

A spectral variance analysis is discussed based on the filtering properties of averaging processes. The calculation of a raw variance or covariance spectrum of several meteorological parameters is allowed when integrating average measured values are used for calculation. A data processing installation producing the integrating average measured values, as well as the intermediate storage of data for measurements in the free, is described. The shortest integration time for a single value was found to be 40 msec. Some measurements were carried out with a freely suspended platinum wire as an inertialess temperature sensor and a constant-temperature hot wire anemometer as in inertialess wind sensor. ESRO

N75-27654# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STATISTICAL STRUCTURE OF THE HUMIDITY FIELD IN THE FREE ATMOSPHERE ABOVE THE TERRITORY OF THE USSR
V. S. Komarov 26 Nov. 1974 237 p refs Transl. into ENGLISH

from TR. Nauchn. Issled. Inst. Aeroklimatologii (Moscow), no. 70, 1971 p 1-221
(AD-A004343; FTD-HC-23-1255-74) Avail: NTIS

Contents: Basic parameters of humidity and evaluation of the accuracy of determining them; Methods of aeroclimatic analysis of humidity data and the characteristics of the source material; Characteristics of the vertical humidity distribution in the free atmosphere; Statistical relationships of the humidity in the free atmosphere above the territory of the U.S.S.R.; Optimal representation of vertical humidity and temperature profiles with the aid of natural orthogonal functions. GRA

N75-27655# Environmental Technical Applications Center (Air Force), Washington, D.C.
INTERIM INSTRUCTIONS FOR THE USE OF AIR STAGNATION WEATHER CHARTS AND MESSAGES
Don W. Janssen Jan. 1975 21 p refs
(AD-A004535; USAFETAC-TN-73-1-Rev; USAFETAC-TN-73-1) Avail: NTIS CSCL 04/2

The instructions and information contained in the report will aid the duty forecasters in interpreting and tailoring air stagnation facsimile charts and teletype messages to local requirements. It explains the messages and charts available and, in general, covers their use. Procedures in use overseas and domestically are included. GRA

N75-27656# Arizona Univ., Tucson.
A TWO DIMENSIONAL GLOBAL CLIMATIC MODEL Interim Report, 1 Jun. - 30 Nov. 1974
William D. Sellers 15 Dec. 1974 17 p refs
(Grant AF-AFOSR-2633-74; ARPA Order 2592)
(AD-A004483; AFOSR-75-0120TR) Avail: NTIS CSCL 04/2

A two-dimensional horizontal box model of the global climate is being expanded to include a hydrologic cycle. Output variables would include cloud cover, relative humidity, and precipitation and evaporation rates. The proposed hydrologic cycle is outlined and a flow diagram for the complete model is presented. GRA

N75-27657*# Wisconsin Univ., Madison. Center for Climatic Research.
WORKSHOP ON PALEOCLIMATIC TRANSFER FUNCTIONS Final Report, 15 Mar. - 15 Sep. 1974
Wayne M. Wendland 15 Dec. 1974 15 p refs Workshop held at Madison, Wisconsin, 3 Apr. 1974
(ARPA Order 2556)
(AD-A004471; AFOSR-75-0126TR) Avail: NTIS CSCL 04/2

The workshop brought together about 50 researchers who use statistical transfer functions to reconstruct climatic series from surrogates of climate. The purpose was to provide a free forum for exchange of information. Discussion centered on the following topics: (1) Transfer function types, i.e., statistics involved in the development of each. The features of each of the various types were emphasized; (2) Major limitations to all transfer functions, e.g., no modern analogues for conditions at some time in the past, grid size of modern sample array to adequately describe the past conditions; (3) Calibration of the transfer function, i.e., verification of the climatic reconstructions; (4) Peculiar problems of and insights gained by the various interest groups, in such areas as tree ring analysis, paleoclimatelogy, and deep sea core analysis. GRA

N75-27658# Massachusetts Inst. of Tech., Cambridge.
BIDIMENSIONAL SPECTRAL ANALYSIS OF RAINFALL EVENTS
Alonso E. Rhenals-Figueredo Nov. 1974 217 p refs
(Contracts di-14-31-001-9021; NOAA-4-36738)
(PB-239797; W75-04932) Avail: NTIS HC $7.25 CSCL 04B

In order to study the characteristics of the regional component, a number of storms over a given area are analyzed. For each storm, a double Fourier analysis of the total storm depths is performed, and the principal harmonics of the storm are determined. This analysis was made to determine whether or not there exists a persistent pattern in total storm depths over a given area. The local component, or storm residuals, is obtained by subtracting the periodic component of the storm from the total storm depths. It is assumed that the residuals of each storm are a sample function of a homogeneous random field, which, in principle, may be different for each storm. The characteristics of each underlying random field are analyzed by using the bidimentional autocorrelation function of the residuals of each storm. The observation of these functions has led to the conclusion that it is reasonable to assume that the random fields are also isotropic, and therefore, each one can be characterized by an isotropic one-dimensional autocorrelation function or its corresponding spectral density function. A theoretical model for the isotropic normalized autocorrelation function is proposed and discussed. The corresponding spectral density function and the radial spectral density function are analytically determined, and a comparison is made of the empirical spectral density function and the theoretical one for several storm residuals. Author

N75-27659# Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
ON THE COLLECTION, THE ANALYSIS, AND THE SYNTHESIS OF SPATIAL RAINFALL DATA
Roberto L. Lenton and Ignacio Rodriguez-Iturbe Oct. 1974 220 p refs
(Contracts DI-14-31-0001-9021; NOAA-4-36738)
(PB-239856; R74-61; Rept-194) Avail: NTIS CSCL 04B

The development of a systematic approach to the design of programs of rainfall data management, which include the collection, the analysis and the synthesis of rainfall data, was studied. The collection and analysis of data, processed for the purpose of estimating areal averages of rainfall, is formulated as a mathematical programming problem whose objective function is the minimization of the cost and mean square error of the network, and whose decision variables are the total number of raingages, the coordinates of each of them, and the estimator weights. A two-stage methodology is proposed, wherein the optimal configuration of the network is determined first, followed by the optimal estimator weights. The synthesis of processes of areal averages of rainfall is treated by proposing an extension to a previous model of point rainfall synthesis. The proposed model generates sample functions of a random process of areal rainfall averages that preserve its areal covariance structure. The possibility of using point and areal rainfall models as an aid to decision making in network design problems is considered. The problem of inferring the characteristics of extreme values of areal rainfall is also studied. The distribution of the annual areal rainfall maximum per event is derived. Author

N75-27660# Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
MULTIDIMENSIONAL CHARACTERIZATION OF THE RAINFALL PROCESS. PART 1: SYNTHETIC GENERATION OF HYDROLOGIC SPATIAL PROCESSES. PART 2: ON THE TRANSFORMATION OF POINT RAINFALL TO AREAL RAINFALL
Jose M. Mejia and Ignacio Rodriguez-Iturbe Nov. 1973 58 p refs
(Contract DI-14-31-0001-9021; Grant NOAA-2-36235)
(PB-239855/0; R74-7; W75-04930; OWRT-C-4118(9021)(6)) Avail: NTIS HC $4.25 CSCL 08H

A procedure for the synthesis of processes exhibiting temporal and spatial variability is presented. The method involves the addition of harmonics of random frequencies which are sampled from the spectral density function or the radial spectral density function. The process obtained is asymptotically Gaussian and ergodic. An estimate of the error in time or space averages due to the nonergodicity of the process as function of the number of harmonics is also included. A general methodology is developed for the transformation of point rainfall to areal rainfall. The methodology can be used to characterize the input to rainfall-runoff models and it includes the case in which multiple inputs are used in the model in the form of a subdivision in modules of the whole catchment. GRA

N75-27661# Purdue Univ., Lafayette, Ind. Water Resources Research Center.
PROBABILISTIC ANALYSIS AND SIMULATION OF THE SHORT TIME INCREMENT RAINFALL PROCESS Final Report, Sep. 1970 - Dec. 1974
Ramachandra A. Rao and B. T. Chenchayya Dec. 1974 139 p refs Sponsored by Dept. of Interior
(PB-239872; W75-05173; TR-55) Avail: NTIS CSCL 04B

The characteristics of short time increment rainfall sequences were analyzed. Results indicate that the Weibull distribution best fit the distributions of the duration of wet and dry sequences, although the exponential distribution was also adequate. The regression models for storm depth-duration relationship were found adequate when they were used with appropriately classified storms. The characteristics of the ten minute and hourly data were found to be similar. Author

N75-27662# Purdue Univ., Lafayette, Ind. Water Resources Center.
ANALYSES OF THE EFFECT OF URBANIZATION ON RAINFALL CHARACTERISTICS 1 Final Report, Sep. 1970 - Dec. 1974
Ramachandra A. Rao and R. G. Srinivasa Rao Dec. 1974 205 p refs
(PB-239871; W75-05172; TR-50) Avail: NTIS CSCL 04B

The significance was studied of observed changes in precipitation in and around urban areas. The assumption was made that the annual data are independent and identically distributed random variables and analyzed by using the multivariate and univariate tests. As a by-product of this analysis, the minimum number of observations required to estimate a given change in the mean was estimated. The main conclusions are (1) the observed increases in the monthly and annual rainfall in and around urban areas are statistically significant in many instances. The observed increase in LaPorte rainfall is definitely significant. (2) These increases do not occur in only warm or in the cold seasons. (3) The tests based on time series models are better than multivariate and univariate tests based on the independent and identically distributed assumption. The available length of data from any station in the affected period is sufficient to carry out various statistical tests to obtain reliable results. Author

N75-27663# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
THE GENERATION OF SECONDARY ICE PARTICLES IN CLOUDS BY CRYSTAL-CRYSTAL COLLISION Ph.D. Thesis
Larry Vardiman Nov. 1974 135 p refs
(Grant NSF GI-31460)
(PB-239940; CSU-ATSTP-230) Avail: NTIS CSCL 04B

The number of ice crystal fragments generated in a cloud is described a function of the collision frequency between crystals and the number of fragments produced per collision. The number of fragments generated per collision was determined experimentally by observing the fragmentation of various types of ice crystals upon impact with a fixed plate. This fragmentation rate was combined with the collision frequency in a numerical model to determine the optimum cloud conditions for secondary particle generation. The additional crystals generated in smooth stratiform clouds may reach a maximum of ten times the expected natural crystal concentration at or near cloud base. Secondary crystal concentrations in stratiform clouds with embedded convention could reach 100 to 1000 times the expected natural concentrations. Author

N75-27664# Environmental Data Service, Washington, D.C.
MARINERS WEATHER LOG, VOLUME 19, NUMBER 2, MARCH 1975
Elwyne E. Wilson Mar. 1975 70 p
(COM-75-90008-03; NOAA-75031101) Avail: NTIS MF $2.25; HC available free to persons or agencies with a marine interest from the Environmental Data Service, Page. Bldg. 1 (D762), 2001 Wisconsin Ave., N. W., Washington, D. C. 20235 CSCL 04B

This volume consists of three articles (abstracted separately) concerning extreme wind and wave return periods for the U.S. coast; satellite detection of upwelling in the Gulf of Tehuantepec, Mexico; and Eastern North Pacific tropical cyclones, 1974. Also included are notes concerning tropical cyclone Tracy, current information of oceanic and atmospheric importance, marine weather reviews and marine weather diaries. GRA

N75-27665# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
THEORETICAL ANALYSIS AND EXPERIMENTAL EVALUATION OF A PROTOTYPE PASSIVE SENSOR TO MEASURE CROSSWINDS
S. F. Clifford, G. R. Ochs, and Ting-L Wang Sep. 1974 34 p refs Sponsored in part by ECOM
(COM-75-10426/5; NOAA-TR-ERL-312; WPL-35; NOAA-75032104; ECOM-74-3) Avail: NTIS; SOD HC as C55.13:ERL 312-WPL 35 CSCL 04B

The performance is discussed of a prototype passive wind sensor. The instrument interprets the turbulence-induced optical scintillations of a random scene to infer a path-weighted transverse wind speed between scene and observer. The fundamental theoretical relations on which the system is based are derived. The overall capabilities and limitations of the technique are discussed. GRA

N75-27666# National Hurricane and Experimental Meteorology Lab., Coral Gables, Fla.
A CASE STUDY OF TWO STORMFURY CLOUDLINE SEEDING EVENTS
Robert C. Sheets and Samuel C. Pearce Feb. 1975 55 p refs
(COM-75-10425/7; NOAA-TM-ERL-WMPO-21; NHEML-109; NOAA-75032016) Avail: NTIS HC $4.25 CSCL 04B

Two cloudline seeding cases were selected for study from the Project STORMFURY cloudline exercises. One case involved clouds in a rather active convective environment while the other case was more isolated. Both cases show that the seeded clouds grew more than the surrounding clouds but no unbiased control clouds were monitored. The temperatures at the 550 mb level in the distributed area were approximately 1C colder than ambient temperatures. This temperature drop is attributed to evaporative cooling in an extremely dry layer which existed at this level. No significant temperature change was noted at the 350 mb level, but at least a temporary increase in the broad scale water vapor content at this level was observed. The duration of these changes is undetermined. GRA

N75-27667# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
A THEORETICAL ANALYSIS OF THE INFORMATION CONTENT OF LIDAR ATMOSPHERIC RETURNS
V. E. Derr, M. J. Post, R. L. Schwiesow, R. F. Calfee, and G. T. McNice Nov. 1974 299 p refs
(COM-75-10393/7; NOAA-TR-ERL-296; WPL-29; NOAA-75030304) Avail: NTIS; SOD HC as C55.13:ERL 296-WPL 29 CSCL 04B

The applicability of new laser technology to observation of meteorological parameters is explored in this study of the relevant information content in laser radiation after interaction with the atmosphere. References and an extended bibliography are presented. Theoretical background is included only when it is not expected to be within the normal range of expertise of meteorologists, and then only in summary. GRA

N75-27668# National Oceanic and Atmospheric Administration, Las Vegas, Nev. Air Resources Lab.
MESOSCALE WIND PREDICTION WITH THE INERTIAL EQUATION OF MOTION
John S. Cornett and Darryl Randerson Jan. 1975 32 p refs (ERDA Order SF-54-351)
(COM-75-10405/9; NOAA-TM-ERL-ARL-48; ARLV-351-47; NOAA-75032015) Avail: NTIS HC $3.75 CSCL 04B

A mesoscale wind prediction model based solely on the inertial equation of motion is verified on an hourly basis against persistence for 33, independent, 6-hour periods. The model is also compared with another mesoscale wind-prediction model derived from a horizontal vorticity theorem. The inertial model is demonstrated to be a better model for prediction times ranging from 3 through 6 hours. In the free atmosphere, both models have difficulty outperforming a persistence wind forecast for time periods of 1 to 2 hours and do no better than persistence in the boundary layer. However, the vertical wind shear forecasts by the inertial model are better than persistence for both the early (1 to 2 hour) prediction times and at lower levels in the atmosphere. GRA

N75-27669# National Weather Service, Fort Worth, Tex.
MANUALLY DIGITIZED RADAR GRIDS: A COMPARISON OF RESOLUTION CAPABILITIES FOR A HEAVY RAINFALL SITUATION

James D. Belville Feb. 1975 16 p
(COM-75-10436/4; NOAA-TM-NWS-SR-80;
NOAA-75031701) Avail: NTIS HC $3.25 CSCL 04B

The National Weather Service (NWS) hydrologic and radar programs must improve techniques in accurately locating and quickly identifying heavy rainfall patterns to prevent loss of life. One approach to this problem was the introduction of the Manually Digitized Radar (MDR) Program. This system enabled forecasters and hydrologists to keep track of rainfall patterns by using a quantitative index. Refinement of this system is necessary in order to increase its reliability. In this paper, a higher resolution grid, about 20 n mi (37km) on a side, is used in an attempt to locate a rainfall pattern with more precision than is possible with the present system. Use of the smaller grid also provides a better basis for estimating the magnitude of the rainfall in areas where rainfall data are sparse. GRA

N75-27670# National Weather Service, Salt Lake City, Utah.
MAP TYPE PRECIPITATION PROBABILITIES FOR THE WESTERN REGION
Glenn E. Rasch and Alexander E. MacDonald Feb. 1975 146 p refs
(COM-75-10428/1; NOAA-TM-NWSTM-WR-96;
NOAA-75032103) Avail: NTIS HC $5.75 CSCL 04B

A method of obtaining probabilities of precipitation (PoPs) using 500-mb flow typing similar to that done by Augulis is presented. The typing method differs in that it results in fewer but more distinct flow types. An independent test is presented which shows that for flow significantly different than climatological, the PoPs forecasts represent a substantial improvement over climatology. PoPs for the Western Region and flow type maps are presented for the four seasons. GRA

N75-27671# National Hurricane and Experimental Meteorology Lab., Coral Gables, Fla.
AN EVALUATION OF THE ACCURACY OF TROPICAL CYCLONE INTENSITIES AND LOCATIONS DETERMINED FROM SATELLITE PICTURES
Robert C. Sheets and Paul Grieman (Washington Univ., Seattle) Feb. 1975 43 p refs
(COM-75-10386/1; NOAA-TM-ERL-WMPO-20; NHEML-108;
NOAA-75022405) Avail: NTIS HC $3.75 CSCL 04B

An attempt is made to evaluate the accuracy of tropical cyclone intensity and location estimates determined from satellite information only. Data from three satellites (ESSA, ATS, DMSP) were used for this study. Operationally qualified groups from the National Environmental Satellite Services in Washington and Miami and from the U.S. Air Force Air Weather Service did the storm intensity and location evaluations. Some 50 storms including hurricanes, tropical storms, and Western Pacific typhoons comprised the data sample. The results indicate that higher resolution satellite data result in more accurate positioning but the accuracy of intensity estimates is not necessarily a function of the resolution. Logically, strong systems are more accurately located than weak systems. GRA

N75-27672# Arizona Univ., Tucson. Dept. of Watershed Management.
PROBABILISTIC MODEL OF RARE HYDROLOGIC EVENTS
Martin M. Fogel, John L. Thames, and Lucien Duckstein 1974 15 p refs Presented at the Ann. Meeting of the Am. Soc. of Agr. Engr., Stillwater, Okla., 23-26 Jun. 1974
(Contract DI-14-31-0001-3858)
(PB-240290/7; W75-05766; OWRT-b-032-ARIZ(8);
Paper-74-2006) Avail: NTIS HC $3.75 CSCL 04B

A methodology is presented for analyzing the frequency of rare hydrologic events. Two cases illustrate the procedure in which a previously developed event-based probability model was used. In the first instance, a frequency distribution was derived for the seldom-occurring tropical storms that pass through Arizona. A technique for defining such storms from readily available National Weather Service climatological data was used to obtain a parameter value for the Poisson distribution describing the number of events per time interval. For the second example, a distribution for peak discharges was derived with the assumption that storm depths and storm durations for the air mass (nonfrontal) type of thunderstorm were unrelated random variables. The distribution was obtained by using the Soil Conservation Service method for estimating runoff from rainfall in a probabilistic formulation. GRA

N75-27456 Joint Publications Research Service, Arlington, Va.
STATISTICAL METHODS OF GROUPING THE RAINDROP SPECTRA
V. V. Tsykunov *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 55-64 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 47-54 (For availability see N75-27450 18-42)

N75-27458 Joint Publications Research Service, Arlington, Va.
CALCULATING THE WINTER CIRCULATION IN THE NORTH ATLANTIC
A. S. Sarkisyan and A. Stashkevich *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 73-84 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 62-70 (For availability see N75-27450 18-42)

N75-27461 Joint Publications Research Service, Arlington, Va.
DYNAMICS OF ATMOSPHERIC PROCESSES IN THE 5-15 DEG LATITUDE TROPICAL ZONE
Ye. M. Dobryshman *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 112-120 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 91-96 (For availability see N75-27450 18-42)

N75-27467 Virginia Univ., Charlottesville.
IMPLICATIONS FROM THE GATE DROPWINDSONDE PROGRAM REGARDING A-SCALE CIRCULATIONS
R. H. Simpson and Joanne Simpson *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 1-11 refs (For availability see N75-27466 18-42)

N75-27468 Hydrometeorological Scientific Research Center (USSR).
ON THE EVOLUTION OF INTERTROPICAL CONVERGENCE ZONE
M. A. Petrosiants, A. I. Snitkovsky, and A. I. Falkovich *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 12-28 refs (For availability see N75-27466 18-42)

N75-27469 Hydrometeorological Scientific Research Center (USSR).
COMPARISON OF BALANCE CHARACTERISTICS FOR STRONG AND DEPRESSED INTERTROPICAL CONVERGENCE ZONES
A. I. Falkovich and V. A. Antsipovich *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 29-50 refs (For availability see N75-27466 18-42)

N75-27470 GATE Operational Control Centre, Dakar (Senegal).
WIND INTERCOMPARISON AFTER PHASE 2 OF GATE
D. Mussa (East African Meteorol. Dept., Nairobi, Kenya) and J. Reiff (Roy. Neth. Meteorol. Inst., De Bilt) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 51-75 (For availability see N75-27466 18-42)

N75-27471 Academy of Sciences of the Ukrainian SSR, Sevastopol (USSR). Inst. of Hydrophysics.
SOME RESULTS OF THE ANALYSIS OF THE INTERCOMPARISON DATA OF THE METEOROLOGICAL COMPLEXES FROM THE SOVIET SHIPS
T. P. Svetlova *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 76-81 ref (For availability see N75-27466 18-42)

N75-27472 GATE Operational Control Centre, Dakar (Senegal).
PRELIMINARY STUDY OF THE MOISTURE FIELD AT 23.5 DEG W IN THE VICINITY OF THE TRADE INVERSION
Sharon E. Nicholson *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 82-88 (For availability see N75-27466 18-42)

N75-27473 Hydrometeorological Scientific Research Center (USSR).
THE AIR CIRCULATION IN THE TROPICAL TROPOSPHERE ALONG THE MERIDIAN OF 23 DEG 30 MIN W

M. A. Petrossiants, S. Slaby, A. I. Snitkovsky, and A. I. Falkovich *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 89-95 (For availability see N75-27466 18-42)

N75-27474 GATE Operational Control Centre, Dakar (Senegal).
WEATHER FORECASTING FOR GATE
Robert W. Burpee (Natl. Hurricane Res. Lab., Miami, Fla.) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 96-100 (For availability see N75-27466 18-42)

N75-27475 Arkticheskii i Antarkticheskii Nauchno-Issledovatelskii Inst., Leningrad (USSR).
ON THE TEMPORAL STRUCTURE OF THE FIELDS OF METEOROLOGICAL ELEMENTS IN THE TROPICAL FREE ATMOSPHERE
I. I. Tsigilnitsky *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 101-110 refs (For availability see N75-27466 18-42)

N75-27476 World Meteorological Organization, Geneva (Switzerland).
THE 150-MILLIBAR WINDS FROM GATE EQUATORIAL SHIPS
David E. Parker *In its* Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 111-128 refs (For availability see N75-27466 18-42)

N75-27479 GATE Operational Control Centre, Dakar (Senegal).
COMPOSITE MASS BUDGETS FOR THE INNER HEXAGON OF THE EAST ATLANTIC SHIP ARRAY
David R. Rodenhuis (Maryland Univ., College Park) and Hyo-Duck Chang (Maryland Univ., College Park) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 145-158 Sponsored in part by Univ. Corp. for Atmospheric Res. (For availability see N75-27466 18-42)
(Grant NSF GA-32778)

N75-27480 Central Aerological Observatory, Moscow (USSR).
PRELIMINARY RESULTS OF COMPARISON OF SMALL-SCALE WIND AND TEMPERATURE FIELDS IN THE TROPICAL ZONE OF THE ATLANTIC AND IN MIDDLE LATITUDES
V. P. Beliaev, V. K. Dmitriev, V. F. Makarov, and G. N. Shur *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 159-168 (For availability see N75-27466 18-42)

N75-27481 GATE Operational Control Centre, Dakar (Senegal).
VARIATION OF THE INTER-TROPICAL CONVERGENCE ZONE DURING PHASES 1, 2, AND 3 OF THE GATE EXPERIMENT
Sharon E. Nicholson *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 169-175 (For availability see N75-27466 18-42)

N75-27482 GATE Operational Control Centre, Dakar (Senegal).
A SATELLITE CONVECTIVE CODE
David W. Martin (Wisconsin Univ., Madison) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 176-181 refs (For availability see N75-27466 18-42)
(Grant NSF GA-40494)

N75-27483 GATE Operational Control Centre, Dakar (Senegal).
CHARACTERISTICS OF WEST AFRICAN AND ATLANTIC CLOUD CLUSTERS
David W. Martin (Wisconsin Univ., Madison) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 182-190 (For availability see N75-27466 18-42)
(Grant NSF GA-40494)

N75-27484 GATE Operational Control Centre, Dakar (Senegal).
STUDY OF DIURNAL VARIATIONS IN CONVECTION USING QUADRA RADAR, PHASES 1 AND 2
Frank Marks *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 191-204 (For availability see N75-27466 18-42)

N75-27485 Central Aerological Observatory, Moscow (USSR).
ON THE MORPHOLOGY OF CLOUDS OF THE EASTERN ZONE OF TROPICAL ATLANTIC
A. M. Borovikov, Y. V. Lavrentiev, and I. P. Mazin *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 205-206 refs (For availability see N75-27466 18-42)

N75-27486 Central Aerological Observatory, Moscow (USSR).
ON THE MICROSTRUCTURE OF HIGH CLOUDS BY OBSERVATIONS MADE DURING GATE 74
A. N. Nevzorov and V. F. Shugaev *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 207-210 ref (For availability see N75-27466 18-42)

N75-27487 GATE Operational Control Centre, Dakar (Senegal).
AIRCRAFT OBSERVATIONS OF ITCZ STRUCTURE ON 4 AUGUST 1974
Richard J. Reed (Washington Univ., Seattle), Noel E. LaSeur (Florida State Univ.), and David Berrill (London Univ.) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 211-216 (For availability see N75-27466 18-42)

N75-27488 GATE Operational Control Centre, Dakar (Senegal).
AN EXAMPLE OF A SQUALL LINE IN THE B-SCALE NETWORK
Richard J. Reed (Washington Univ., Seattle) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 217-222 (For availability see N75-27466 18-42)

N75-27489 Mainz Univ. (West Germany). Inst. fuer Meteorologie.
TURBULENT FLUXES IN THE ITCZ DURING GATE PHASE 3 AT STATION 27
J. Mueller-Glewe and H. Hinzpeter *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 224-232 refs Sponsored by Deut. Forschungsgemeinschaft (For availability see N75-27466 18-42)

N75-27490 Hydrometeorological Service of the USSR.
THE RESULTS OF THE DIRECT MEASUREMENTS OF TURBULENT CHARACTERISTICS FOR PLANETARY BOUNDARY LAYER
V. D. Andreev, V. N. Ivanov, V. C. Korolev, V. M. Linkin, T. F. Masagutov, A. V. Smirnov, and Y. Holtz *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 233-244 refs Prepared jointly with Acad. of Sci., Moscow (For availability see N75-27466 18-42)

N75-27491 World Meteorological Organization, Geneva (Switzerland).
VARIATIONS OF EVAPORATION IN THE B-SCALE AREA OF GATE
Heinrich Hoeber *In its* Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 245-251 (For availability see N75-27466 18-42)

N75-27492 National Oceanic and Atmospheric Administration, Washington, D.C. Center for Experiment Design and Data Analysis.
PRELIMINARY ESTIMATES OF TURBULENT ENERGY FLUXES IN THE WESTERN B-SCALE ARRAY
Peter L. Grose *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 252-259 ref (For availability see N75-27466 18-42)

N75-27493 Academy of Sciences (USSR), Moscow. Inst. of Atmospheric Physics.
CHARACTERISTICS OF THE TURBULENT EXCHANGE BETWEEN THE OCEAN AND ATMOSPHERE IN THE EQUATORIAL ATLANTIC
L. G. Elagina, B. M. Koprov, and Y. A. Volkov *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 260-266 refs (For availability see N75-27466 18-42)

N75-27494 Academy of Sciences (USSR), Moscow.
THE INTERACTION BETWEEN THE SURFACE AND THE ATMOSPHERE AT THE EQUATOR

V. M. Radikevich and E. I. Serjakov *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 267-275 refs (For availability see N75-27466 18-42)

N75-27495 National Center for Atmospheric Research, Boulder, Colo.
A STUDY OF THE SUBCLOUD LAYER IN THE VICINITY OF AN ISOLATED LINE OF CUMULUS
William T. Pennell *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 276-286 (For availability see N75-27466 18-42)

N75-27496 National Center for Atmospheric Research, Boulder, Colo.
PROFILES AND SPECTRA OF FAIR WEATHER TURBULENCE DATA FROM THE US L-188 AIRCRAFT DURING GATE
R. L. Grossman *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 287-293 refs (For availability see N75-27466 18-42)

N75-27497 Main Geophysical Observatory, Leningrad (USSR).
VERTICAL PROFILES OF RADIATION FLUX DIVERGENCE IN TROPICAL ATMOSPHERE
V. F. Zhvalev, M. A. Prokofyev, and N. E. Ter-Markaryants *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 294-297 refs (For availability see N75-27466 18-42)

N75-27498 Mainz Univ. (West Germany). Inst. fuer Meteorologie.
E-TYPE ABSORPTION IN THE TROPICS
Hartmut Grassl *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 298-303 refs (For availability see N75-27466 18-42)

N75-27499 Central Aerological Observatory, Moscow (USSR).
VERTICAL PROFILES OF THE LONG-WAVE RADIATION FLUXES ON THE GATE AREA
Nina A. Zaitseva *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 304-309 (For availability see N75-27466 18-42)

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N75-27673 British Library Lending Div., Boston Spa (England).
ON THE EFFECT OF THE THERMAL STATE OF THE WATERS OF THE NORTH ATLANTIC ON THE FORMATION OF THE TEMPERATURE FIELD OVER THE EURASIAN CONTINENT
M. A. Dujceva and D. A. Ped [1974] 20 p refs Transl. into ENGLISH from Tr. Gidromet. Nauch.-Issled. Cent. SSSR (Leningrad), v. 93, 1972 p 21-37
(BLL-M-23538-(5828.4F)) Avail: British Library Lending Div., Boston Spa., Engl.: 2 BLL photocopy coupons

Long range weather forecasting methods which consider the effect of the thermal state of oceans and seas on the weather of adjoining continental regions are reviewed. The effect of the thermal state of the Atlantic Ocean on the formation of the temperature field over the Eurasian continent is analyzed. Meteorological parameters considered in the analysis include: atmospheric circulation, ocean surface waters, and air temperature anomalies. Results are discussed. J.M.S.

N75-27674 Rhode Island Univ., Kingston.
SEASONAL AND VERTICAL DISTRIBUTION OF ZOOPLANKTON IN AN ESTUARINE ANOXIC BASIN AND THEIR TOLERANCES TO HYDROGEN SULFIDE AND DISSOLVED OXYGEN Ph.D. Thesis
Sandra L. Vargo 1974 188 p
Avail: Univ. Microfilms Order No. 75-13703

A monthly sampling program was conducted from January, 1972, to July, 1973, in the lower basin of the Pettaquamscutt River to observe the seasonal and vertical distribution of chemical, physical, and biological factors. The monthly sampling included temperature, salinity, and hydrogen sulfide measurements at several depths. These depths varied according to the depth of the hydrogen sulfide layer. Net tows for zooplankton were taken from 0-3 m and 3-5 m, and total abundance and species composition were determined for the zooplankton community. Close-interval pumped samples were taken around the hydrogen sulfide - oxygen interface over a 24 hr period to detect vertical migration and penetration of the hydrogen sulfide layer by zooplankton in December, 1971, and July, 1972. Pumped samples were also taken in March, April, May, and July, 1973, to observe the reactions of species not present in the 24 hr samples to hydrogen sulfide. Dissert. Abstr.

N75-27675# Joint Publications Research Service, Arlington, Va.
OCEAN PARAMETERS AND CARRIER SPEED
11 Jun. 1975 29 p refs Transl. into ENGLISH from Tr. Gos. Okeanogr. Inst. (Moscow), no. 117, 1973 p 5-16, 35-45
(JPRS-64975) Avail: NTIS HC $3.75

The results of comparative measurements of wind produced sea surface contours using radar methods and a ship wave recorder on the Passat weather ship are reported. Data are also given on a study of the dependence of the results of sea state parameter measurement on the carrier speed. For individual titles, see N75-27676 through N75-27677.

N75-27676 Joint Publications Research Service, Arlington, Va.
RESULTS OF COMPARATIVE MEASUREMENTS OF WIND-PRODUCED SEA SURFACE CONTOURS USING RADAR METHODS AND SHIP WAVE RECORDER ON THE WEATHER SHIP PASSAT
Ye. O. Zhilko, A. A. Zagorodnikov, I. V. Kireyev, V. I. Korniyenko, B. A. Maksimov, and A. V. Svechnikov *In its* Ocean Parameters and Carrier Speed (JPRS-64975) 11 Jun. 1975 p 1-14 refs Transl. into ENGLISH from Tr. Gos. Okeanogr. Inst. (Moscow), No. 117, 1973 p 5-16 (For availability see N75-27675 18-48)

A radar accessory to marine navigation radars, designed to measure wave heights and the general direction of wave propagation, was tested. Operating principles of the accessory are given along with sensitivity characteristics. Data from the tests show: (1) heights of sea waves can be measured by using series built navigation radar equipped with a device discriminating the required information from radar signals, (2) that in order to determine the principle direction of a wave motion with an accuracy of several degrees, the design of the navigation radar must be augmented with a manual antenna slewing drive and an antenna rotation angle indicator, (3) the maximum error in measuring wave heights can be attained in the range of 10 to 15%, and (4) to extend the section of optimal range, to increase the operating qualities of the device, it is desirable to incorporate in the intermediate frequency amplifier an automatic gain control circuit. Author

N75-27677 Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF RESULTS OF SEA STATE PARAMETER MEASUREMENT ON SPEED OF CARRIER
A. A. Zagorodnikov *In its* Ocean Parameters and Carrier Speed (JPRS-64975) 11 Jun. 1975 p 35-45 refs Transl. into ENGLISH from Tr. Gos. Okeanogr. Inst. (Moscow), no. 117, 1973 p 35-45 (For availability see N75-27675 18-48)

Attempts made to estimate distortions in sea state measurements, caused by carrier motion and speed, are reported. Measured spectra and true spectra for frequency versus time spectra was discussed. E.H.W.

N75-27678# Joint Publications Research Service, Arlington, Va.
OCEAN TURBULENCE
10 Jul. 1975 28 p refs Transl. into ENGLISH from the book Probl. Polucheniya i Obrabotki Informatsii o Fizicheskom Sostoyanii Okeana, (Sevastopol) 17 Jul. 1967 p 100-114
(JPRS-65189) Avail: NTIS HC $3.75

A towed complex of hydrophysical apparatus, a method of investigating ocean turbulence is described and the statistical structure of turbulent fields of the ocean in the development of discrete analog-to-code converters is given. The towed devices

are divided into three basic types: towed garlands, uncontrolled towed containers, and controlled towed containers. Towed garlands measure the temperature field in the surface layer of the ocean; uncontrolled towed containers are used for solving oceanographic problems (i.e. elimination of the vessels influence); controlled towed containers register isotherms. Author

N75-27679# Joint Publications Research Service, Arlington, Va.
SEA NOISE
A. V. Furduyev 10 Jul. 1975 104 p refs Transl. into ENGLISH from the book "Akust. Okeana" Moscow, Izdatelstvo Nauka, 3 Jun. 1974 p 615-691
(JPRS-65187) Avail: NTIS HC $5.25

The basic experimental and theoretical data on the properties of natural noise fields in the ocean are presented. Noise measurements of ice, sea creatures, sea storms, and seismic disturbances are studied. Author

N75-27680# Washington Univ., Seattle. Dept. of Atmospheric Sciences.
[SEA ICE RESEARCH IN THE ARCTIC OCEAN] Annual Report, 1 Oct. 1973 - 30 Sep. 1974
Norbert Untersteiner, Gary Maykut, Seelye Martin, Thomas Grenfell, and Ronald Roulet 1 Dec. 1974 30 p refs
(Contract N00014-67-A-0103-0007; NR Proj. 307-252)
(AD-A003606; AR-6) Avail: NTIS CSCL 08/12

Research topics include: (a) growth and ablation of sea ice, (b) sea ice dynamics, (c) optical properties of sea ice, (d) desalination of sea ice, (e) thickness distribution of sea ice, and (f) generation of internal waves in the ocean by pressure ridge keels. GRA

N75-27681# RAND Corp., Santa Monica, Calif.
OCEAN CIRCULATION AND TEMPERATURE PREDICTION MODEL. 1: THE PACIFIC
R. C. Alexander Oct. 1973 73 p refs
(Contract DAHC15-73-C-0181; ARPA Order 189-1)
(AD-A004619; R-1296-ARPA) Avail: NTIS CSCL 08/3

The research was undertaken to develop a numerical model for monthly and seasonal predictions of temperatures and velocities in the upper layers of the ocean. The Pacific model represents one phase in the development of a world ocean model for climate dynamics experiments with a coupled atmospheric model. The circulation and temperature distribution in the upper layers of the Pacific Ocean are simulated by a two-level numerical model with a horizontal bottom at 300 m depth. The model is based on the primitive Eulerian equations and contains a free upper surface. The motion is driven by prescribed distributions of surface heating and wind stress, and is retarded by frictional stresses at the bottom and at the coasts. GRA

N75-27682# Oregon State Univ., Corvallis. School of Oceanography.
EXPOSURE: A NEWSLETTER FOR OCEAN TECHNOLOGISTS, VOLUME 2, NUMBER 6
Roderick Mesecar Jan. 1975 14 p
(Contract N00014-67-A-0369-0007; NR Proj. 083-102)
(AD-A004623) Avail: NTIS CSCL 08/3

Contents: Understanding drogue performance by instrumented tests; Simulated strumming of the savonius rotor; An integrating data logger system. GRA

N75-27683# National Oceanographic Instrumentation Center, Washington, D.C.
MARK 3 WATER QUALITY MONITORING SYSTEM, MARTEK INSTRUMENTS, INC., NEWPORT BEACH, CALIFORNIA 92660
1974 16 p
(COM-75-10019/8; NOAA-74112102; IFS-75003) Avail: NTIS HC $3.25 CSCL 08J

The Martek Mark 3 water quality monitoring system is a portable, integrated system for the simultaneous measurement of temperature, conductivity, pressure, dissolved oxygen, and pH. Salinity and depth are also displayed, but are derived from the conductivity/temperature and pressure measurements, respectively. The underwater unit consists of individual sensor housings banded together with large hose clamps. The system can be powered by 115-v.a.c, internal rechargeable batteries, or an external d.c. source. An external recorder may be used with the unit via a multipin connector. Details are given on manufacturer's specifications and performance tests. GRA

N75-27445 Joint Publications Research Service, Arlington, Va.
DISTRIBUTION OF ANTARCTIC SEA ICE DETERMINED USING SATELLITE OBSERVATIONS
V. V. Yevseyev *In its* Soviet Antarctic Inform. Bull. (JPRS-64980) 11 Jun. 1975 p 1-5 Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 14-17 (For availability see N75-27444 18-42)

N75-27448 Joint Publications Research Service, Arlington, Va.
EXPERIENCE IN USING SATELLITE DATA IN TRAVERSING ANTARCTIC DRIFT ICE DURING THE 1970-1971 NAVIGATION SEASON
V. V. Yevseyev *In its* Soviet Antarctic Inform. Bull. (JPRS-64980) 11 Jun. 1975 p 20-22 Transl. into ENGLISH from Inform. Byull. Sov. Antarkt. Eksped. (Leningrad), no. 90, 1975 p 102-104 (For availability see N75-27444 18-42)

N75-27462 Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF VARYING THE SALT EXCHANGE BETWEEN THE BLACK AND AZOV SEAS BY CREATING A FRESHWATER BUFFER ZONE
I. A. Shlygin *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 121-127 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 97-100 (For availability see N75-27450 18-42)

N75-27465 Joint Publications Research Service, Arlington, Va.
DETERMINATION OF THE SURFACE LAYER TEMPERATURE OF THE BERING SEA ACCORDING TO THE AERIAL THERMAL SURVEY DATA
G. V. Girdyuk, G. G. Zykova, and F. S. Terziyev *In its* Meteorol. and Hydrol., No. 4, 1975 (JPRS-65174) 9 Jul. 1975 p 141-147 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 4, 1975 p 109-112 (For availability see N75-27450 18-42)

N75-27477 GATE Operational Control Centre, Dakar (Senegal).
SEA-SURFACE TEMPERATURE VARIATION OFF THE WEST COAST OF AFRICA DURING PHASE 1 OF GATE
Sharon E. Nicholson *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 129-136 (For availability see N75-27466 18-42)

N75-27500 Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla. Div. of Physical Oceanography.
LONG, WESTWARD WAVES IN THE UPPER EQUATORIAL ATLANTIC
W. Dueing and R. Evans *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 310-319 refs (For availability see N75-27466 18-42)

N75-27501 Academy of Sciences (USSR), Kaliningrad. Inst. of Oceanology.
ON VARIABILITY OF WATER TEMPERATURE IN THE EQUATORIAL ATLANTIC
V. A. Bubnov, K. V. Moroshkin, and V. D. Egorikhin *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 320-326 refs (For availability see N75-27466 18-42)

N75-27502 Academy of Sciences (USSR), Kaliningrad. Inst. of Oceanology.
NEW DATA ON WATER DYNAMICS IN THE EQUATORIAL ATLANTIC
V. A. Bubnov, V. D. Egorikhin, and K. V. Moroshkin *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 327-332 refs (For availability see N75-27466 18-42)

N75-27503 Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla. Div. of Physical Oceanography.
MEANDER MOTIONS IN THE EQUATORIAL ATLANTIC
O. B. Brown and K. Voigt (Inst. fuer Meereskunde, Rostock, East Ger.) *In* WMO Prelim. Sci. Results of the GARP Atlantic

Trop. Expt., Vol. 1 Jan. 1975 p 333-337 (For availability see N75-27466 18-42)

N75-27504 Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla. Div. of Physical Oceanography.
CURRENT PROFILING OBSERVATIONS BY THE RV CAPRICORNE
W. Dueing, P. Hisard (Office de la Rech. Sci. et Tech. Outre-Mer, Abidjan, Ivory Coast), and J. Low *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 338-340 (For availability see N75-27466 18-42)

N75-27505 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
TIME-VARIATIONS OF THE UPPER EQUATORIAL CURRENT SYSTEM IN THE ATLANTIC OCEAN (PRELIMINARY RESULTS)
Jens Meincke *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 341-344 ref (For availability see N75-27466 18-42)

N75-27506 Centre de Recherches Oceanographiques, Abidjan (Ivory Coast).
A PRELIMINARY REPORT OF THE GATE PHASE 2 CRUISE OF THE RV CAPRICORNE
P. Hisard, J. Citeau, A. Morliere, J.-M. Verstraete, and B. Voituriez *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 345-349 (For availability see N75-27466 18-42)

N75-27507 State Oceanographic Inst., Moscow (USSR).
PRELIMINARY ANALYSIS OF THE MATERIALS OF CURRENTS MEASUREMENTS AT THE EQUATOR DURING THE GATE EXPEDITION
A. A. Ribnikov *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 350-353 ref (For availability see N75-27466 18-42)

N75-27508 Academy of Sciences of the Ukrainian SSR, Sevastopol (USSR). Inst. of Hydrophysics.
HORIZONTAL EDDY HEAT, DENSITY AND MOMENTUM TRANSPORTS IN THE LOMONOSOV CURRENT
A. P. Mirabel and V. M. Vasilenko *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 354-358 refs (For availability see N75-27466 18-42)

N75-27509 Academy of Sciences of the Ukrainian SSR, Sevastopol (USSR). Inst. of Hydrophysics.
ABOUT ORTHOGONAL PATTERN FUNCTIONS OF THE VERTICAL STRUCTURE OF LOMONOSOV CURRENT
A. P. Mirabel and V. M. Vasilenko *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 359-364 refs (For availability see N75-27466 18-42)

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N75-27684# Technische Universitaet, Munich (West Germany).
THE DEVELOPMENT AND APPLICATION OF COMPUTER METHODS AND COMPUTER PROGRAMS FOR THE STRUCTURAL ANALYSIS OF PROTEINS - FOR EXAMPLE THE TRYPSIN-TRYPSIN INHIBITOR COMPLEXES, THE FREE INHIBITORS, AND THE L-ASPARAGINASE Ph.D. Thesis [DIE ENTWICKLUNG UND ANWENDUNG VON RECHENVERFAHREN UND RECHENPROGRAMMEN ZUR STRUCKTURANALYSE VON PROTEINEN AM BEISPIEL DES TRYPSIN-TRYPSININHIBITOR KOMPLEXES, DES FREIEN INHIBITORS UND DER L-ASPARAGINASE]
Wolfgang Steigemann 25 Jul. 1974 121 p refs In GERMAN
Avail: NTIS HC $5.25

Structural analysis of the complex between trypsin and the trypsin inhibitor by crystallographic calculations establishes heavy atom positions in isomorph derivatives and phases of the native protein. A Fourier synthesis of the complex structures at 2.8 A is provided. An atomic model for the trypsin inhibitor is formulated from experimental data up to 1.9 A resolution. Crystallographic proof for the tetrameric substructure of L-asparaginase is developed that shows molecular pseudo positions at a 222 point symmetry. A probable packing scheme is developed in combination with Patterson functions. Transl. by G.G.

N75-27685# Advisory Group for Aerospace Research and Development, Paris (France).
VIBRATION AND COMBINED STRESSES IN ADVANCED SYSTEMS
Henning E. VonGierke, ed. (AFSC) Mar. 1975 272 p refs In ENGLISH; partly in FRENCH Presented at the Aerospace Med. Panel Specialists Meeting, Oslo, 22-23 Apr. 1974
(AGARD-CP-145) Avail: NTIS HC $8.50

Operational vibration environments and their psychophysiological effects on performances of crews of aircraft, land vehicles, and ships are studied. For individual titles, see N75-27686 through N75-27713.

N75-27686 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
AIRCREW ASSESSMENT OF THE VIBRATION ENVIRONMENT IN HELICOPTERS **c54**
B. H. Rance and J. W. Chappelow *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

A survey of military helicopter crews was carried out to determine the scope and nature of problems due to vibration. Three hundred questionnaires were completed. The chief consequences of vibration were discomfort and difficulty in reading displays. The occurrence of these effects was associated with significant increases in reported fatigue. The major effects were, mainly confined to the larger aircraft. Most of the reports from Royal Navy helicopters were associated with hovering or transition to or from the hover; turbulence was found to increase the number of reports of vibration effects. Loading of the aircraft was not found to cause any increase in the number of reports.
Author

N75-27687 Max-Planck-Institut fuer Landarbeit und Landtechnik, Bad Kreuznach (West Germany).
HUMAN EXPOSURE TO WHOLE-BODY VIBRATION IN MILITARY VEHICLES AND EVALUATION BY APPLICATION OF ISO/DIS 2631 **c54**
Heinrich Dupuis *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

The vibration strain of soldiers and test drivers in military vehicles concerns mainly those reactions which, by the way of influencing the sensation and motoric coordination, can decrease the human performance when operating vehicles and carrying out military tasks. So especially visual sensation will be influenced by vibration stress. Furthermore, vibration at high amplitude in certain frequency ranges may lead to injuries to health. Results of vibration measurements in 13 wheeled vehicles, 3 tanks and 2 ambulances show that the vibration stress under certain conditions may be very high. By the use of national and international standards the measured vibration stress is evaluated. As consequences of these results technical improvements and daily exposure time limits are proposed. Author

N75-27688 Surface Effects Ship Project Office, Bethesda, Md.
CREW PERFORMANCE REQUIREMENTS IN THE VIBRATION ENVIRONMENTS OF SURFACE EFFECT SHIPS **c53**
Alfred Skolnick *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 22 p refs (For availability see N75-27685 18-51)

Basic requirements and habitability standards are studied for designing surface effect ships employing a self generated cushion of air for lift support with vertical motion centering in the 0.2 to 3.0 Hz region. Emphasis is placed on vibratory loads and crew performance. Using empirical data from 100-ton testcraft and motion predictions from a 2000-ton SES math model, a simulated pilot house is stimulated to portray ship response characteristics at various speeds in diverse sea states. Results of these motion simulations and selected critical crew

tasks conducted during the tests for up to four hour intervals are discussed. Author

N75-27689 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
THE TRANSMISSION OF ANGULAR ACCELERATION TO THE HEAD IN THE SEATED HUMAN SUBJECT **c52**
G. R. Barnes and B. H. Rance *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

Sinusoidal angular oscillation in yaw of seated human subjects, both restrained and unrestrained, has demonstrated that responses of significant amplitude may be elicited in all three head axes. In the unrestrained condition, the torso appeared to absorb the input acceleration, the response of the head in the yaw axis exhibiting very rapid attenuation and large phase lags at frequencies above 4 Hz. In the restrained condition, the transmission to the yaw axis of the head was much less severely attenuated with smaller phase lags above 4 Hz. The yaw responses in the unrestrained condition exhibited a resonant peak at 2 Hz. In both experimental conditions there was a significant response in both the roll and pitch axes of the head. The response in pitch exhibited significant 2nd harmonic components which were manifested as a frequency doubling effect between 1 and 6 Hz. Author

N75-27690 Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.
THE EFFECT OF THE INDIVIDUAL AND COMBINED STRESSES OF VIBRATION AND SUSTAINED G ON PILOT PERFORMANCE **c53**
A. G. Piranian *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 13 p refs (For availability see N75-27685 18-51)

The human centrifuge was used to evaluate the relative influences of sustained normal accelerations, combined vertical and lateral buffet loads, and basic aircraft flying qualities on air-to-air tracking performance in air combat maneuvering flight. Performing the simulation in an actual F-4B cockpit, 11 pilots were tasked with tracking a moving target with a fixed reticle sight presented in visual display. Sustained accelerations from 1.3 to 5.0 g's, buffet intensity levels from buffet free to + or - .5 g, and lateral directional flying qualities were varied independently in several combinations to assess their individual and combined influences on tracking precision. Results show that for the buffet frequency used (10 cps), intensities up to + or - .5 g have negligible effects on performance. Sustained accelerations up to 5.0 g's have appreciable effects, degrading tracking by 10 mils over the 1.0 g level. Flying qualities' influences were substantial, and greater than those of either buffet or acceleration. Decreased dutch roll frequency and/or damping, adverse aileron yaw, and proverse aileron yaw were seen to have degrading effects on performance. Author

N75-27691 Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Acceleration Physiology Dept.
EFFECTS OF TRANSIENT VIBRATIONS ON HUMAN SAFETY AND PERFORMANCE **c54**
Lorenz H. Vogt *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 10 p refs (For availability see N75-27685 18-51)

Transient vibrations and impact forces represent possible hazards in underground personnel shelters when subjected to pressure waves from nuclear blasts. Calculated and simulated acceleration time relationships are compared to safety limits for humans. By way of an existing nonlinear model for supine humans, the application of a general model for transient and steady state conditions is proposed. Performance limits for transient conditions are scarce. Some information may be gained by applying the results from steady state experiments to transient conditions. Author

N75-27692 Centre d'Essais en Vol, Bretigny-sur-Orge (France). Lab. de Medecine Aerospatiale.
ACTION OF LOW VIBRATION FREQUENCIES ON THE CARDIOVASCULAR SYSTEM OF MAN [ACTION DES VIBRATIONS DE BASSES FREQUENCES SUR LE SYSTEME CARDIO-VASCULAIRE DE L'HOMME] **c52**
J. Demange, R. Auffret, and B. Vettes *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 5 p refs In FRENCH (For availability see N75-27685 18-51)

Cardiac variability in subjects exposed to low frequency mechanical vibrations was studied. Vascular response to these vibrations was also measured. Particular attention was given to physiological disorders, especially in the case of vibration effects on sick or wounded subjects. Measurements were made of circulation and human performance after exposure to the vibrations; some subjects were required to perform complex tasks. Transl. by E.H.W.

N75-27693 Kentucky Univ., Lexington. Wenner-Gren Research Lab.
EFFECTS OF VIBRATION STRESS ON THE CARDIOVASCULAR SYSTEM OF ANIMALS
Ernest P. McCutcheon *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 13 p refs (For availability see N75-27685 18-51)

Results from a recent series of investigations on the mechanisms and pathways involved in the two major types of physiological responses to mild to moderate levels of vibration exposure are reported. The majority of these studies are based on the chronically instrumented animal preparation. In addition to representative cardiovascular and mechanical variables, many of the studies include hormonal metabolic, hematological, and psychological measurements in order to quantify the vibration parameters, estimate the overall stress level, identify specific response patterns, and evaluate the relative dependence of cardiovascular changes on these factors. Author

N75-27694 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
LABORATORY STUDIES ON CHRONIC EFFECTS OF VIBRATION EXPOSURE **c52**
D. V. Sturges, D. W. Badger (Natl. Inst. for Occupational Safety and Health, Cincinnati), R. N. Slarve, and D. E. Wasserman (Natl. Inst. for Occupational Safety and Health, Cincinnati) *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 2 p refs (For availability see N75-27685 18-51)

Rhesus monkeys were chronically exposed to sinusoidal vibration in the Z axis. Gastrointestinal bleeding and lowered hematocrits were noted during exposure. Multiple lesions of the gastric mucosa were seen at necropsy. The impression is one of early erosive hemorrhaging gastric lesions with subsequent adjustment to the stress and resultant healing of the lesions. Author

N75-27695 National Inst. for Occupational Safety and Health, Cincinnati, Ohio.
SERUM AND URINE CHANGES IN MACACA MULATTA FOLLOWING PROLONGED EXPOSURE TO 12 Hz, 1.5 g VIBRATION **c52**
D. W. Badger, D. V. Sturges (Aerospace Med. Res. Lab.), R. N. Slarve (Aerospace Med. Res. Lab.), and D. E. Wasserman *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 3 p refs (For availability see N75-27685 18-51)

Serum and urine changes in male rhesus monkeys were measured before, during, and after exposure to 12 Hz, 1.5 g vibration 5 hours daily for 130 hours. Marked erythrocyte loss occurred in 10 exposed animals within 3 weeks, probably as a result of extensive gastrointestinal lesions. Serum albumin globulin ratios decreased. Similar values for 13 controls were unchanged during this time. No evidence of renal impairment was seen since serum creatinine was unchanged and hematuria, increased proteinuria and urine sediment morphology were either absent or not changed. Author

N75-27696 Centre d'Essais en Vol, Bretigny-sur-Orge (France). Lab. de Medecine Aerospatiale.
RAPID FLIGHT VIBRATION PHENOMENA AND SPINE FRACTURES [PHENOMENES VIBRATOIRES RAPIDES EN VOL ET FRACTURES DU RACHIS] **c52**
R. Auffret, R. P. Delahaye, and J. Salvagniac *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 5 p refs In FRENCH (For availability see N75-27685 18-51)

Severe vibrations leading to vertebral fractures to pilots of

high performance jet aircraft are examined. Specifically two cases were studied-sudden intensive accelerations causing ejection from seats, and aircraft malfunctions or sudden movements as caused by turbulence, pilot correction procedures, aircraft control, or servomechanism malfunctions. Transl. by E.H.W.

N75-27697 Army Aeromedical Research Lab., Fort Rucker, Ala.
EFFECTS OF VIBRATION ON THE MUSCULOSKELETAL SYSTEM **c52**
Walter M. Braunohler *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

No significant change occurs in bone mineral density after short term helicopter flying. However, the impact conditions of basic physical training induce 10% demineralization of the distal ulna. It is our impression that this is a transient phenomenon. Long term follow-up of helicopter pilots flying 6.5 hours/week over two years reveals no evidence of musculoskeletal strain; however, there appears to be a trend towards demineralization of the distal radius. Continued monitoring of this population group is recommended to determine when pathological changes may be expected to occur. Author

N75-27698 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
THE RESPIRATORY AND METABOLIC EFFECTS OF CONSTANT AMPLITUDE WHOLE-BODY VIBRATION IN MAN **c52**
G. R. Sharp, G. A. Patrick, and W. R. Withey *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 6 p refs (For availability see N75-27685 18-51)

Nine human subjects were exposed to constant amplitude whole body, G sub z vibration, for 10 minutes, at frequencies of 2, 4, 6, 8 and 10 Hz. It was found that at 2 and 4 Hz pulmonary ventilation, oxygen uptake, end tidal carbon dioxide tension and heart rate were unchanged. At frequencies of 6, 8 and 10 Hz, however, there was an increase in pulmonary ventilation and in oxygen uptake. Pulmonary ventilation was increased in excess of the oxygen uptake, resulting in hyperventilation. There were no qualitative or quantitative differences in values of pulmonary ventilation or oxygen uptake between subjects when unrestrained and when fully restrained on the vibrator. Most subjects experienced discomfort or pain during exposure to frequencies of 6, 8 and 10 Hz. It is considered that this pain induced the observed hyperventilation. The increase in oxygen uptake is thought to be related to the tensing of musculature. Author

N75-27699 Southampton Univ. (England). Human Factors Research Unit.
A STUDY OF VIBRATION, PILOT VISION AND HELICOPTER ACCIDENTS **c53**
Michael J. Griffin *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 16 p refs (For availability see N75-27685 18-51)

A series of experiments has been conducted to investigate the hypothesis that the occurrence of helicopters flying into wires is associated with vibration having a detrimental effect on pilot visual acuity. The research commenced with an investigation of the evidence for the problem by surveying the incidence of wire strikes and determining the conditions in which they occur. The second study measured pilot visual acuity during flight in two different helicopter types. It was concluded that under normal conditions the loss of visual acuity in these two helicopters was unlikely to be a major cause of wire strikes. The third investigation resulted in the detailed specification of the vibration experienced in the Scout AH Mk 1 helicopter. Particular emphasis was placed on the changes in vibration with the various flight conditions and the differences between pilots and between aircraft of the same type. The final series of experiments were designed to determine the minimum levels of vibration which would affect visual acuity. Author

N75-27700 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
MECHANISMS OF VIBRATION EFFECTS ON AIRCREW PERFORMANCE **c53**
Richard W. Shoenberger *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 9 p refs (For availability see N75-27685 18-51)

The effects of vibration on a variety of human performance tasks are reviewed. Research is categorized with respect to the predominant performance requirements of the tasks investigated, and results are evaluated in order to determine which aspects of task performance (sensory input, central processing, and motor output) are affected by vibration interference. This procedure reveals that the vast majority of vibration effects occur for tasks which require fine sensory discrimination or precise motor response, or both; only a very few studies show effects which can be attributed to interference with intellectual or cognitive functions. On the basis of logical analyses of differential vibration effects on various types of tasks it is suggested that the predominant mechanism for vibration performance effects is direct mechanical interference with functions occurring in the input and output stages of operator performance tasks. Vibration effects on tasks which are primarily intellectual in nature and have minimal sensorimotor requirements are discussed in relation to generalized stress mechanisms. Recent research is described in which analytical decomposition of reaction time measures made it possible to definitively isolate vibration effects on peripheral and central performance functions within a single task. Author

N75-27701 Dayton Univ. Research Inst., Ohio.
PERFORMANCE AND PHYSIOLOGICAL EFFECTS OF COMBINED STRESS INCLUDING VIBRATION **c52**
J. C. Guignard *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 6 p refs (For availability see N75-27685 18-51)

Whole body vibration affects human task performance by two main mechanisms: peripherally, by mechanical interference at the point of contact between the man and his task; and centrally, by burdening the brain with irrelevant sensory information. In the latter regard, the action of vibration is in some ways akin to that of noise. Any particular effect of vibration on performance depends on many factors, including the physical characteristics of the vibration, the nature of the task and the skill and motivation of the performer, time, and the presence of other stressful agents or circumstances. Unfortunately, our ignorance of the psychophysiological mechanisms by which vibration degrades particular kinds of task performance is still profound, and our knowledge for the most part qualitative in nature. That is mainly because much laboratory based research into the psychophysiological actions of vibration suffers from the lack of an appropriate standardized methodology and of complete and proper measurements of the vibratory forces affecting the man at the time when his performance is being evaluated. Author

N75-27702 Medical Research Council, Cambridge (England).
EFFECTS OF DURATION OF VERTICAL VIBRATION BEYOND THE PROPOSED ISO "FATIGUE-DECREASED PROFICIENCY" TIME, ON THE PERFORMANCE OF VARIOUS TASKS **c52**
R. T. Wilkinson and R. Gray (RAE, Farnborough, England) *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 5 p refs (For availability see N75-27685 18-51)

Six subjects carried out four 3-hour sessions of performance tasks, two with continuous 5 Hz, 1.2 m/s squared rms vertical vibration and two under static conditions. There was no general support for a prediction from the proposed ISO curves of fatigue-decreased proficiency (FDP) that vibration can lower proficiency as a function of duration of exposure. However, vibration associated with a 1-hour vigilance task and knowledge of results decreased proficiency towards the end of the 3-hour work period. Author

N75-27703 Advisory Group for Aeronautical Research and Development, Paris (France).
PERIPHERAL VISION ARTIFICIAL HORIZON DISPLAY **c54**
R. Malcolm, K. E. Money, and P. Anderson *In its* Vibration and Combined Stresses in Advan. Systems Mar. 1975 3 p ref (For availability see N75-27685 18-51)

The artificial horizon instrument currently used in aircraft suffers from two shortcomings; the pilot cannot obtain continuous information from it, since he must also look at other instruments

and second, during episodes of heavy vibration, turbulence or disorientation, a small instrument becomes extremely difficult to read. This paper describes a device which projects a line or bar of light from beside the pilot's head forward onto the instrument panel. The line is approximately one to four inches wide and subtends 160 - 170 deg of arc from the pilot's head, so that it extends well into his peripheral vision. The light source is driven by servomotors which are controlled from the aircraft's inertial gyros, such that the bar of light seen by the pilot duplicates the pitch and roll motions of the real horizon outside the cockpit. The advantages of this display are: visibility during turbulence and vibration, visibility while looking at other instruments, and reduction of the pilot's workload by making use of the neural programming which naturally orients us with the horizon.

Author

N75-27704 Federal Inst. for Occupational Safety and Accident Research, Dortmund (West Germany).

A REVIEW OF BIOMECHANICAL MODELS FOR THE EVALUATION OF VIBRATION STRESS c54

Wolfgang Lange *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 8 p refs (For availability see N75-27685 18-51)

Physical resonances of the human body or of its parts under vibration correlate with subjective responses. Biodynamic models can be calculated from data of vibration investigations. Several such models are discussed. The models differ in their degrees of freedom, in their mass, elasticity and damper elements, and in the way these elements are coupled. A further important parameter is the linearity or nonlinearity of the model. For the evaluation of vibratory stress it is necessary to establish physiological and/or psychological criteria which correlate with biomechanical responses that can be simulated by models. Several methods for evaluating vibration stress are discussed and compared.

Author

N75-27705* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

AN ELEMENTARY PSYCHOPHYSICAL MODEL TO PREDICT RIDE COMFORT IN THE COMBINED STRESS OF MULTIPLE DEGREES OF FREEDOM c54

Ralph W. Stone, Jr. *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

The quality of airplane rides probably will become increasingly important to passengers, particularly in terminal area operations and on short haul trips. The development of models to predict ride comfort is considered. An elementary model concept is presented herein and compared with subjective ride comfort response ratings measured on actual scheduled airline flights and simulated flights.

Author

N75-27706 Kentucky Univ., Lexington.

MODELS OF THE CARDIOVASCULAR SYSTEM UNDER WHOLE BODY VIBRATION STRESS c52

Charles F. Knapp *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 13 p refs (For availability see N75-27685 18-51)

Five major mechanisms can be listed as the main factors responsible for producing alterations in the circulatory system exposed to vibration. The mechanisms important for vibration stress of a given waveform, frequency, displacement, acceleration, transmitted force, axis, and duration are: (1) reaction of the fluid and vessel system; (2) reaction of large body organ systems and the musculoskeletal system; (3) reaction of the mechanoreceptors; (4) reaction of the hormonal metabolic and hematological systems; and (5) reaction modification through the central nervous system and the psychophysiological pathways. Analytical efforts are reviewed as they relate to the five mechanisms listed above and current efforts in modeling the hydrodynamic aspects of the cardiovascular system are discussed in order to estimate its relative contribution to the total changes in arterial pressures and flows measured in animals exposed to whole body sinusoidal vibration.

Author

N75-27707 Systems Technology, Inc., Hawthorne, Calif.

EVALUATING BIODYNAMIC INTERFERENCE WITH OPERATIONAL CREWS c54

Henry R. Jex and R. Wade Allen *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 18 p refs (For availability see N75-27685 18-51)

A review is made of operational situations in which biodynamic interference with aircrews is a problem, and it is shown that there is a large contrast between the information needed to evaluate these problems in operational situations versus that available from existing laboratory research. A structure and means for extrapolating the large and growing empirical data base is discussed. Some progress in work along these lines is presented, including: Systems performance models for interrelating the many variables; refined biomechanical models for analyzing vibration feedthrough to controls in closed loop manual tasks; and procedures for including habitability or ride ratings in the overall evaluations.

Author

N75-27708 Advisory Group for Aeronautical Research and Development, Paris (France).

THE ISO GUIDE FOR THE EVALUATION OF HUMAN WHOLE BODY VIBRATION EXPOSURE c52

G. Bobbert *In its* Vibration and Combined Stresses in Advan. Systems Mar. 1975 6 p refs (For availability see N75-27685 18-51)

It exists a demand for regulations to evaluate the vibration exposure of human beings. Although the knowledge of the human reaction is not sufficient for all cases of vibration exposure, experts from ten countries discussed a standard which gives a guide for the evaluation. As this standard is agreed by the ISO-Council and it is now going to be printed, the background of this standard and the most important details are reported.

Author

N75-27709 Royal Aircraft Establishment, Farnborough (England). Human Engineering Div.

PROPOSED LIMITS FOR EXPOSURE TO WHOLE BODY VERTICAL VIBRATION, 0.1 TO 1.0 Hz c52

Geoff Allen *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 11 p refs (For availability see N75-27685 18-51)

The need for design standards for civil and military vehicles to cover human reaction to vibration below 1 Hz is outlined. Limits are proposed against two criteria: the first, to prevent severe discomfort merges at 1 Hz with the DIS2631 exposure limit; the second, to prevent reduced comfort merges at 1 Hz with the DIS2631 reduced comfort boundary. Because of lack of information, limits have been given for 25 minute and 8 hour durations only, and it has not been possible to suggest values for the preservation of working efficiency. The information on which the proposals are based is outlined, namely some twenty laboratory and field investigations and critical reviews, yielding about fifty data points. Considering the approximate nature of some of the information it is relatively consistent, and reinforces previous assertions that the critical frequency range for motion sickness is below 0.5 Hz.

Author

N75-27710 Boeing Co., Wichita, Kans.

RIDE QUALITY OF CREW MANNED MILITARY AIRCRAFT c54

Stanley H. Brumaghim *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

Ride quality criteria are compared in terms of both short term and extended term crew performance decrement thresholds. Flight test data are included which illustrate the capability to modify aircraft response to gusts through ride control systems. Requirements to strengthen application of existing criteria to design of airplane ride control systems are given. Chief among these areas are the need for improved ability to handle human response to frequencies of vibration below 1.0 Hz and in validation of thresholds for extended exposure to vibration. Test data are also discussed which show the need to consider impact of ride environment on time to complete crew tasks, in addition to the more frequent concern with impact on performance errors.

Author

N75-27711 Centre de Recherches de Medecine Aeronautique, Paris (France).

STUDY OF MAN'S PHYSIOLOGICAL RESPONSE TO EXPOSURE TO INFRA-SOUND LEVELS OF 130 dB [ETUDE

CHEZ L'HOMME DES EFFETS PHYSIOLOGIQUES D'UNE EXPOSITION A DES NIVEAUX INFR-SONORES DE 130 DB] c52
P. Borredon, J. Nathie, and A. Gibert *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 13 p refs In FRENCH (For availability see N75-27685 18-51)

Infrasound effects on the physiological functions of man, after a 50 minute exposure period, were investigated. Special efforts were made to observe circulatory reactions and summarize totally the action of aerial infrasonic vibrations. Measurements were made of time response to a luminous solicitation, cardiac frequency, and maximum and minimum arterial pressure. An audiogram was made of the aerial luminary tones. Detailed results are given in tabular form. Transl. by E.H.W.

N75-27712 Centre de Recherches de Medecine Aeronautique, Paris (France).
EFFECT OF LOW FREQUENCY AERIAL VIBRATIONS ON NOCTURNAL ACTIVITY OF A RAT [EFFET D'UNE EXPOSITION A DES VIBRATIONS AERIENNES DE BASSE FREQUENCE SUR L'ACTIVITE NOCTURNE DU RAT] c52
P. Pesquies and J. Nathie *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 4 p refs In FRENCH (For availability see N75-27685 18-51)

Observations were made of rat nocturnal activity after exposure to general aerial vibrations. The rats were exposed for eight hours to sinusoidal vibrations at a pressure of 147 dB and at frequencies of 8, 16, and 32 Hz. Results indicate the vibrations were not loud enough to severely influence nighttime activity, however, some increases and decreases were noted depending on exposure level. Transl. by E.H.W.

N75-27713 Erlangen-Nuremberg Univ. (West Germany).
VIBRATESE LANGUAGE c54
Wolf D. Keidel *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 9 p refs (For availability see N75-27685 18-51)

A brief review of the work done to develop vibratese languages is given. A special type of vibratese language is described using the v. Bekesy model of the cochlea. Here the frequency range of speech is adapted to that of the vibrotactile system without changing the time domain so that the speech communication by means of a mechanical stimulation of the skin of the human forearm can be performed in real time. A highly sophisticated computer program for the LINC 8 or PDP 12 has been written for this purpose. Author

N75-27714*# Scientific Translation Service, Santa Barbara, Calif.
ON THE DIRECTED MONITORING OF STERILIZATION
M. Schreiber and F. Hajduk Washington NASA Jul. 1975 9 p refs Transl. into ENGLISH from Deut. Gesundheitswesen (East Germany), v. 30, no. 17, 1975 p 811-813
(Contract NASw-2483)
(NASA-TT-F-16459) Avail: NTIS HC $3.25 CSCL 06M

The magnitude and the causes of failures in sterilization are evaluated, and the effectiveness of an additional indicator to strengthen sterilization monitoring is tested. The spore-earth test is evaluated for the hot air and steam sterilization separately for the period from 1971 to 1973. A glucose-plasma indicator is shown to increase the effectiveness of the biological control when used in conjunction with the standard spore-earth test. Author

N75-27715*# Kanner (Leo) Associates, Redwood City, Calif.
Ca SALTS OF THE SACCUS ENDOLYMPHATICUS AND PROCESSES OF CALCIFICATION OF BONES DURING NORMAL AND EXPERIMENTAL METAMORPHOSIS IN TADPOLES OF BUFO VULGARIS, RANA DALMATINA AND RANA ESCULENTA
A. Guardabassi Washington NASA Jul. 1975 33 p refs Transl. into ENGLISH from Arch. Anat. Microscop. Morphol. Exp. (France), v. 41, no. 2, 1952 p 143-167
(Contract NASw-2790)
(NASA-TT-F-16472) Avail: NTIS HC $3.75 CSCL 06C

The feeding of tadpoles with thymus was found to have no significant effect on the size of the animals, the development of the saccus endolymphaticus, its Ca salt content or bone calcification. Experiments on exposure to thyroxine seem to indicate that the calcium salts in the saccus endolymphaticus can gradually be mobilized during normal metamorphosis to compensate for any calcium deficiency in the surrounding medium, a finding partly indicated by the fact that the metamorphosis of the tadpoles exposed to thyroxine was accelerated and the bones were unable to calcify completely. Author

N75-27716*# Kanner (Leo) Associates, Redwood City, Calif.
DEGRADATION OF MITOCHONDRIA IN YEAST INDUCED BY ANAEROBIOSIS AT DIFFERENT GROWTH PHASES
V. N. Luzikov, Ye. I. Raynina, and A. S. Zubatov Washington NASA Jul. 1975 11 p refs Transl. into ENGLISH from Tsitologiya. (USSR), v. 17, no. 3, 1975 p 337-342
(Contract NASw-2481)
(NASA-TT-F-16458) Avail: NTIS HC $3.25 CSCL 06M

Prolonged anaeroboisis was studied which leads to degenerative changes in the mitochondria of Saccharomyces cerevisiae yeasts. These are manifested by the decline in the activity of several respiratory enzymes and the degradation of their structure, as revealed by electron microscope monitoring of the cells. The degree of mitochondrial degradation occurring in the yeasts under anaerobic conditions depends on the culture's stage of growth. The cell mitochondria are most labile in the beginning of the logarithmic phase. The possible causes and mechanisms of mitochondrial degradation are discussed. Author

N75-27717*# Mississippi Valley State Univ., Itta Bena.
BIOLOGICAL INDICATORS FOR MONITORING WATER QUALITY OF MTF CANALS SYSTEM Semiannual Status Report, 26 Apr. 1974 - 25 Apr. 1975
S. L. Sethi 25 Apr. 1975 16 p refs
(Grant NsG-8009)
(NASA-CR-143178) Avail: NTIS HC $3.25 CSCL 06B

Biological models, diversity indexes, were developed to predict environmental effects of NASA's Mississippi test facility (MTF) chemical operations on canal systems in the area. To predict the effects on local streams, a physical model of unpolluted streams was established. The model is fed by artesian well water free of background levels of pollutants. The species diversity and biota composition of unpolluted MTF stream was determined; resulting information will be used to form baseline data for future comparisons. Biological modeling was accomplished by adding controlled quantities or kinds of chemical pollutants and evaluating the effects of these chemicals on the biological life of the stream. Author

N75-27718# Armed Forces Radiobiology Research Inst., Bethesda, Md.
CEREBRAL TEMPERATURE CHANGES IN THE MONKEY (MACACA MULATTA) AFTER 2500 RADS IONIZING RADIATION
W. L. McFarland and J. A. Willis Apr. 1974 15 p refs
(DNA Proj. MWED-QAXMA905)
(AD-A004854; AFRRI-SR-74-7) Avail: NTIS CSCL 06/18

To determine the temperature response of the brain to radiation, thermistor temperature sensing probes were implanted into thalamic and cortical areas of eight monkeys and the arch of the aorta. After securing base-line temperature recordings, the monkeys were exposed to 2500 rads whole-body pulsed mixed gamma-neutron radiation in the AFRRI-TRIGA reactor. Temperature at all measured sites generally dropped briefly immediately after the pulse, then rose and stayed elevated 1-2C for the remainder of the 3-1/2-hour observation period. There did not appear to be any regional differences in brain temperature response, and brain temperature followed core (aortic) temperature changes. GRA

N75-27719# Armed Forces Radiobiology Research Inst., Bethesda, Md.
TEMPORAL CHANGE IN RADIOSENSITIVITY OF MINIATURE SWINE AS EVALUATED BY THE SPLIT-DOSE TECHNIQUE
J. F. Taylor, J. L. Terry, M. E. Ekstrom, and J. E. West Jul. 1974 26 p refs
(DNA Proj. NWED-QAXMC903)
(AD-A004597; AFRRI-SR-74-14) Avail: NTIS CSCL 06/18

Using the split-dose technique, recovery was measured in miniature swine exposed to whole-body 60Co gamma radiation

delivered at 34-35 rads/minute. The initial conditioning dose (150 rads) was approximately two-thirds of the normal LD50/30 (237 rads). The redetermined or challenge LD50/30 measured 28 days after the conditioning dose was 477 rads, indicating 260 percent recovery from the initial sublethal dose. Histopathological examinations of three animals euthanatized 28 days after 150 rads revealed no histologic evidence that could account for the radioresistant state at that time. GRA

N75-27720# Franklin Inst. Research Labs., Philadelphia, Pa. Science Information Sciences Dept.
STRUCTURE-ACTIVITY CORRELATION BIBLIOGRAPHY, WITH SUBJECT AND AUTHOR INDEX Interim Report
Frank D. Kover Mar. 1975 74 p refs
(Contract EPA-68-01-2657)
(PB-240658/5; EPA-560/1-75-001) Avail: NTIS HC $4.25 CSCL 06T

References are provided to the literature on two principle methods of chemical structure-biological activity correlation which employ multiple regression, the multiple parameter approach (Hansch), and the additive model (Free-Wilson). Papers employing factor analysis, discriminant analysis, pattern recognition, and cluster analysis to correlate chemical structure to biological activity are cited. As these techniques and new ones are published in the literature, they are being included in the compilation. This edition of the bibliography covers the literature to November, 1974. GRA

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N75-27721 Wisconsin Univ., Madison.
THERMOCURRENT DOSIMETRY WITH HIGH PURITY ALUMINUM OXIDE Ph.D. Thesis
Gary Dodson Fullerton 1974 145 p
Avail: Univ. Microfilms Order No. 75-9971

The application of thermocurrent (TC) to ionizing radiation dosimetry was studied. It was shown that TC in alumina has properties that are suited to personnel dosimetry and environmental monitoring. The TC dosimeters were made from thin disks of alumina. Aluminum electrodes were evaporated on each side: on one face a high voltage electrode and on the opposite face a measuring electrode encircled by a guard ring. Exposure to ionizing radiation resulted in stored electrons and holes in metastable trapping sites. The signal was read-out by heating the dosimeter with a voltage source and picoammeter connected in series between the opposite electrodes. The thermally remobilized charge caused a transient TC. The thermogram, TC versus time or temperature, is similar to a TL glow curve. Either the peak current or the integrated current is a measure of absorbed dose. Dissert. Abstr.

N75-27722 Pennsylvania Univ., Philadelphia.
DEVELOPMENTAL PROGRAMMING FOR RETINOTECTAL PATTERNS Ph.D. Thesis
Richard Kevin Hunt 1974 100 p
Avail: Univ. Microfilms Order No. 75-14573

Embryonic development of the retinal axes was studied. It was found that before a certain stage, these axes may be realigned, but then they are irreversibly specified as the permanent reference axes for retionotectal mapping. Axial specification is triggered by the eye itself. When eye cell differentiation was blocked by the thymidine analog, 5-bromodeoxyuridine, the time of specification was shown to correlate with the onset of cytologic differentiation of the ganglion cells in the central optic cup. These results indicate that the control mechanisms for axial specification are localized in the gangliogenic precursor cells in the neuroepithelium, and are activated as a lineage-dependent differentiative event. In earlier embryonic stages the capacity to undergo axial replacement is an advantage, enabling the eye to compensate for spontaneous misalignments or distortions of the retinal axes. Later, the specified permanent axes make possible a fixed plan for position-dependent differentiation of the ganglion cells. Dissert. Abstr.

N75-27723 Colorado State Univ., Fort Collins.
THE EFFECT OF HYPOXIA ON THE PULMONARY CAPILLARIES Ph.D. Thesis
Wiltz Walter Wagner, Jr. 1974 77 p
Avail: Univ. Microfilms Order No. 75-14682

To facilitate study of the effect of hypoxia on pulmonary capillaries, windows were inserted in the chest wall of nine dogs. The total length of all perfused capillaries in the field of observation was then determined for various arterial oxygen tensions. Total perfused capillary length was nearly constant between arterial oxygen tensions of 160 and 70 torr. As the tension fell below 70 torr, recruitment of previously unperfused capillaries occurred; at 40 torr, the total length of perfused capillaries was about four times greater than during normoxia. There was no correlation between the recruitment of capillaries and alterations in left atrial pressure, only a weak correlation with cardiac output changes, but a very strong correlation with increased pulmonary artery pressure. This implies that recruitment is caused by constriction within the lung. This response increases the surface area for gas exchange and therefore could be advantageous during airway hypoxia. Dissert. Abstr.

N75-27724*# Kanner (Leo) Associates, Redwood City, Calif.
HOW IS YOUR HEALTH, COSMONAUT?
I. Bryanov and R. Bayevskiy Washington NASA Jul. 1975 5 p Transl. into English from Izv. (USSR), 8 Feb. 1975 p 5
(Contract NASw-2481)
(NASA-TT-F-16454) Avail: NTIS HC $3.25 CSCL 06E

Assessment of the cosmonauts' state of health is made on the basis of (a) the past medical history, behavior after selection of the cosmonauts during the preparations for the flight, etc.; (b) monitoring the cardiovascular system, emotional state, and other physiological parameters during the space flight, and (c) forecasting any deviations from normal conditions that appear under the effect of flight. The latter is done by heuristic, mathematical, and clinical-physiological methods, which are still in the course of elaboration. Author

N75-27725# Technische Universitaet, Munich (West Germany).
A MULTI-FACTORIAL DESIGN OF COMPUTER SUPPORTED RESEARCH OF HUMAN SLEEP UNDER THE INFLUENCE OF VARIOUS THERMAL CONDITIONS Ph.D. Thesis [EINE MULTIFAKTORIELLE ANORDNUNG ZUR RECHNERGESTUETZTEN UNTERSUCHUNG DES MENSCHLICHEN SCHLAFS UNTER DEM EINFLUSS UNTERSCHIEDLICHER THERMISCHER UMGEBUNGEN]
Peter Riebling 11 Jul. 1974 247 p refs In GERMAN
Avail: NTIS HC $7.50 CSCL 06S

The influence of environmental temperature on physiological loads to sleeping men are studied by evaluating sleep motor movements, moisture loss, skin temperature measurements, and multiple temperature measurements on matress surface. An enviromental temperature of 25 C and 70 percent air humidity increases significantly evaporation of the human body and matress temperature. A correlation between pressure distribution of the human body with matress surface properties and sleep movements is postulated. Transl. by G.G.

N75-27726# Technische Universitaet, Munich (West Germany).
ON THE CLASSIFICATION OF MULTIVARIATE TIME DEPENDENT PATTERNS IN VIEW OF THEIR PROCESS STRUCTURE Ph.D. Thesis [ZUR KLASSIFIKATION MULTIVARIATER, ZEITABHAENGIGER MUSTER IM HINBLICK AUF IHRE PROZESSSTRUKTUR]
Siegfried Poeppl 1974 266 p refs In GERMAN
Avail: NTIS HC $8.50

The most important part of a classification system is optimal feature extraction. A system for automatic evaluation of sleep EEG's is developed that includes a zero ranging procedure, a transformation matrix, and an Euclidean classifier process. Automatic classification results agree with visual classifications even if patterns are time dependent and their realization is multivariable. Transl. by G.G.

N75-27727# Technische Universitaet, Munich (West Germany).
STUDY OF HYDROMECHANICAL MODELS OF THE INNER EAR WITH ILLUSTRATION OF BASILAR MEMBRANE, CORTI-ORGAN, AND COVERING MEMBRANE Ph.D. Thesis

[BEOBACHTUNGEN AN HYDROMECHANISCHEN MODELLEN DES INNENOHRES MIT NACHBILDUNG VON BASILARM CORTI-ORGAN UND DECKMEMBRAN]
Roland Helle 20 May 1974 151 p refs In GERMAN
Avail: NTIS HC $6.25

Relative motion and fluid flow effects in hydromechanical oscillations of the cochlea are studied in order to develop a mechanism of selective augmentation for the inner ear. It is shown that the gap width between corti organ and covering membrane determines cochlear hydrodynamics and thus effects stirrup inclination as well as basilar membrane and covering membrane oscillations as function of frequency. Transl. by G.G.

N75-27728*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PROCEEDINGS OF THE 1973 LYNDON B. JOHNSON SPACE CENTER ENDOCRINE PROGRAM CONFERENCE
Jun. 1975 187 p refs Conf. held at Houston, Tex.
(NASA-TM-X-58155; JSC-09668) Avail: NTIS HC $7.00 CSCL 06P

Papers given at the conference are presented. Subjects covered include the following: biochemical changes during 28 days of space flight, modulating the pituitary-adrenal response to stress, the significance of biorhythms in space flight, the importance of the rein-angiotensin system in normal cardiovascular homeostasis, a progress report of stress-induced changes in corticosteroid metabolism, recent studies of physiological factors involved in the regulation of serotonin content and turnover in the brain, the role of brain biogenic amines in the control of pituitary-adrenocortical activity, application of the water immersion model to man by studies of acid-base homeostasis during simulated weightlessness, the present status of physiological studies and analysis of calcium homeostasis in the Apollo and Skylab programs, and endocrine considerations in the red-cell-mass and plasma-volume changes of Skylab 2 and 3 crews. For individual titles, see N75-27729 through N75-27738.

N75-27729* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BIOCHEMICAL OBSERVATION DURING 28 DAYS OF SPACE FLIGHT
Carolyn S. Leach and Paul C. Kambaut *In its* Proc. of the 1973 JSC Endocrine Program Conf. Jun. 1975 38 p refs (For availability see N75-27728 18-52)
CSCL 06A

With the completion of the 28-day flight of Skylab 2, the sum of biochemical data on human reaction to the weightless environment was significantly extended both quantitatively and qualitatively. The biochemical studies were divided into two broad categories. One group included the more routine blood studies similar to those used in everyday medical practice. The second category encompassed those analyses used to investigate more thoroughly the endocrinological and fluid changes first seen in the crewmembers following the Gemini, Apollo, and Soviet missions. Significant biochemical changes were observed that varied in magnitude and direction, but all disappeared shortly after return to earth. Most of changes indicate successful adaptation by the body to the combined stresses of weightlessness. Results of the biochemical observation are presented in the form of data tables and graphs. Author

N75-27730* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MODULATING THE PITUITARY-ADRENAL RESPONSE TO STRESS
Joan Vernikos-Danellis *In its* Proc. of the 1973 JSC Endocrine Program Conf. Jun. 1975 10 p refs (For availability see N75-27728 18-52)
CSCL 06S

Serotonin is believed to be a transmitter or regulator of neuronal function. A possible relationship between the pituitary-adrenal secretion of steroids and brain serotonin in the rat was investigated by evaluating the effects of altering brain 5-hydroxy tryptamine (HT) levels on the daily fluctuation of plasma corticosterone and on the response of the pituitary-adrenal system to a stressful or noxious stimulus in the rat. The approach was either to inhibit brain 5-HT synthesis with para-chlorophenyl alanine or to raise its level with precursors such as tryptophan or 5-hydroxy tryptophan. Author

N75-27731* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIGNIFICANCE OF BIORHYTHMS IN SPACE FLIGHT
Charles M. Winget *In its* Proc. of the 1973 JSC Endocrine Program Conf. Jun. 1975 11 p refs (For availability see N75-27728 18-52)
CSCL 06P

Evidence is presented that the most important factor in the maintenance of optimal health and performance is the stability of the relationship of one body rhythm to another. The effect of social interaction on performance, well-being, and physiological rhythm synchrony was investigated. Three groups of healthy males, ages 21 to 25, were confined in rooms (3.4 by 5.2 meters (11 by 17 feet)) for a total period of 105 days. Two of the groups were in rooms in which the environment could be regulated. The third group served as the control group and was exposed to ambient experimental conditions. The confined subjects were exposed for periods to several days either to 16 hours of light and 8 hours of dark, or to continuous light at a light intensity of 161 lm/sq m (15 foot-candles). The confined subjects were deprived of all time cues, and meals were ad libitum. The subjects were observed throughout the study by a video camera and were scored for activity. Communications were limited to meal and sample-collection information, and meals and samples were passed through a two-way hatch. Rectal temperature and heart rate (HR) were sampled every 30 minutes by telemetry throughout the study. Results are presented. Author

N75-27732* Harvard Univ., Cambridge, Mass. Medical School.
THE IMPORTANCE OF THE RENIN-ANGIOTENSIN SYSTEM IN NORMAL CARDIOVASCULAR HOMEOSTASIS
Edgar Haber *In* NASA. Johnson Space Center Proc. of the 1973 JSC Endocrine Program Conf. Jun. 1975 8 p refs (For availability see N75-27728 18-52)
CSCL 06P

Studies were carried out on adult mongrel dogs (20 to 30 kilograms) to investigate the importance of the renin-angiotensin system. Results indicate that the renin-angiotensin system plays a major role in the maintenance of circulatory homeostasis when extracellular fluid volume is depleted. It was also found that angiotensin II concentration, in addition to renal perfusion pressure, is a factor in the regulation of renin release. M.J.S.

N75-27733* Baylor Univ., Houston, Tex. Dept. of Physiology.
STRESS-INDUCED CHANGES IN CORTICOSTEROID METABOLISM Progress Report
Martha M. Tacker *In* NASA. Johnson Space Center Proc. of the 1973 JSC Endocrine Program Conf. Jun. 1975 10 p refs (For availability see N75-27728 18-52)
CSCL 06S

Because plasma and urine corticosteroid concentrations are influenced by several factors in addition to adrenal cortex secretion, the effect of stress on all of these factors was determined in order to interpret the plasma and urine concentrations. Progress on the investigation is reported. M.J.S.

N75-27734* Texas Univ., San Antonio. Dept. of Anatomy.
RECENT STUDIES OF PHYSIOLOGICAL FACTORS INVOLVED IN THE REGULATION OF SEROTONIN CONTENT AND TURNOVER IN THE BRAIN
William W. Morgan *In* NASA. Johnson Space Center Proc. of the 1973 JSC Endocrine Program Conf. Jun. 1975 46 p refs (For availability see N75-27728 18-52)
CSCL 06P

The results of investigations of the physiological role of serotonin (5-Ht) in the brain are discussed. Experiments are described in detail and results presented in tabular and graphical form. M.J.S.

N75-27735* Indiana Univ., Bloomington.
THE ROLE OF BRAIN BIOGENIC AMINES IN THE CONTROL OF PITUITARY-ADRENOCORTICAL ACTIVITY
Roger P. Maickel *In* NASA. Johnson Space Center Proc. of

the 1973 JSC Endocrine Program Conf. Jun. 1975 10 p refs (For availability see N75-27728 18-52)
CSCL 06P

It was found that pretreatment of animals with desmethyl imipramine antagonized the reserpine-induced sedation without preventing the decline in brain amines or the hypersecretion of adrenocorticotropic hormone (ACTH). The antagonism of reserpine-induced ACTH hypersecretion by the monoamine oxidose (MAO) inhibitor pargyline (MO 911, N-methyl-N-benzyl-2-propynylamine) was studied. Evidence is presented that this antagonism is related to the level of brain biogenic amines maintained during the course of action of the drug. Pretreatment with MAO inhibitors does not affect the ACTH hypersecretion evoked by exposure to cold or chlorpromazine, lending further support to the hypothesis that reserpine-induced ACTH hypersecretion is related to brain amine changes. Author

N75-27736* Miami Univ., Fla. School of Medicine.
STUDIES OF ACID-BASE HOMEOSTASIS DURING SIMULATED WEIGHTLESSNESS: APPLICATION OF THE WATER IMMERSION MODEL TO MAN
Murray Epstein *In* NASA. Johnson Space Center Proc. of the 1973 JSC Endocrine Program Conf. Jun. 1975 11 p refs (For availability see N75-27728 18-52)
CSCL 06S

The effects of water immersion on acid-base homeostasis were investigated under carefully controlled conditions. Studies of renal acidification were carried out on seven healthy male subjects, each consuming a diet containing 150 meq sodium and 100 meq potassium. Control and immersion studies were carried out on each subject on the fourth and sixth days, respectively, of dietary equilibration, by which time all subjects had achieved sodium balance. The experimental protocols on study days were similar (except for the amount of water administered). Author

N75-27737* Massachusetts General Hospital, Boston. Endocrine Unit.
PARATHYROID HORMONE, CALCITONIN, AND VITAMIN D 1974: PRESENT STATUS OF PHYSIOLOGICAL STUDIES AND ANALYSIS OF CALCIUM HOMEOSTASIS
John T. Potts, Jr. and K. G. Swenson *In* NASA. Johnson Space Center Proc. of the 1973 JSC Endocrine Program Conf. Jun. 1975 27 p refs (For availability see N75-27728 18-52)
CSCL 06P

The role of parathyroid hormone, calcitonin, and vitamin D in the control of calcium and bone metabolism was studied. Particular emphasis was placed on the physiological adaptation to weightlessness and, as a potential model for this purpose, on the immobilization characteristic of space flight or prolonged bed rest. The biosynthesis, control of secretion, and metabolism of these hormonal agents is considered. Author

N75-27738* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ENDOCRINE CONSIDERATIONS IN THE RED-CELL-MASS AND PLASMA VOLUME CHANGES OF THE SKYLAB 2 AND 3 CREWS
Philip C. Johnson (Baylor Coll. of Med., Houston, Tex.), Carolyn S. Leach, and Theda Driscoll (Baylor Coll. of Med., Houston, Tex.) *In its* Proc. of the 1973 JSC Endocrine Program Conf. Jun. 1975 9 p refs (For availability see N75-27728 18-52)
CSCL 06S

The effect of unknown endocrine changes on blood volume of crewmembers was investigated. The results are presented in tabular form. The fact that some of the changes were in the wrong direction suggests that changes in endocrine function were not the primary cause of the decreases in the plasma volume and red cell mass. M.J.S.

N75-27739*# Scientific Translation Service, Santa Barbara, Calif.
THE PROPHYLACTIC EFFECT OF HEAD-COOLING ON COAL MINER'S CRAMPS. REPORT 2: THE EFFECT OF HEAD-COOLING ON COAL MINERS UNDER HOT AND HUMID ENVIRONMENT
Tsuneo Shiratori, Kazuo Sasaki, Yoshihiko Suzuki, Yoshihisa Ito, and Isaoshi Saito Washington NASA Jul. 1975 16 p refs Transl. into ENGLISH from Tohoku Ishi (Japan), v. 66, no. 2, 1963 p 266-271
(Contract NASw-2483)
(NASA-TT-F-16449) Avail: NTIS HC $3.25 CSCL 06E

An examination was conducted of to 12 individuals who had been subjected to head-cooling in the hot and humid environment of the Joban coal mine to determine their body temperature, pulse, respiration, blood pressure, rate of perspiration, blood gravity, blood capacity, blood count, plasma protein, and urine. The results are discussed. Author

N75-27740*# Scientific Translation Service, Santa Barbara, Calif.
THE COMPOSITION OF URINE AND FECES IN HEALTHY SUBJECTS
V. G. Vysotskiy, T. F. Vlasova, A. N. Kochetkova, A. S. Ushakov, and S. K. Shishkina Washington NASA Jul. 1975 8 p refs Transl. into ENGLISH from Vop. Pitan. (USSR), no. 6, Nov. - Dec. 1974 p 35-38
(Contract NASw-2483)
(NASA-TT-F-16420) Avail: NTIS HC $3.25 CSCL 06P

The data on the urine and fecal composition were determined and processed statistically for young, healthy male examinees. The experiments were conducted under controlled conditions with the maintenance of standard diet. It was found that, for the given category of people, the normal values of the component parts of both urine and feces will fluctuate. Author

N75-27741*# California Univ., La Jolla. Dept. of Neurosciences.
CLINICAL APPLICATIONS OF THE HUMAN BRAINSTEM RESPONSES TO AUDITORY STIMULI
Robert Galambos and Kurt Hecox [1975] 19 p refs Presented at the Proc. of the Brussels Conf., 1974
(Grants NGR-05-009-198; NS-10482)
(NASA-CR-143134) Avail: NTIS HC $3.25 CSCL 06P

A technique utilizing the frequency following response (FFR) (obtained by auditory stimulation, whereby the stimulus frequency and duration are mirror-imaged in the resulting brainwaves) as a clinical tool for hearing disorders in humans of all ages is presented. Various medical studies are discussed to support the clinical value of the technique. The discovery and origin of the FFR and another significant brainstem auditory response involved in studying the eighth nerve is also discussed. J.R.T.

N75-27742*# California Univ., La Jolla. Dept. of Neurosciences.
THE AUDITORY NEURAL NETWORK IN MAN
Robert Galambos [1975] 24 p refs
(Grants NGR-05-009-198; NS-10482)
(NASA-CR-143135) Avail: NTIS HC $3.25 CSCL 06P

The principles of anatomy and physiology necessary for understanding brain wave recordings made from the scalp of normal people are briefly discussed. Brain waves evoked by sounds are described and certain of their features are related to the physical aspects of the stimulus and to the psychological state of the listener. The position is taken that data obtained through scalp probes can reveal a large amount of detail about brain functioning and that analysis of such records enable detection of the response of the nervous system to an acoustic message at the moment of its inception and to the progress of the message through the brain. Brain events responsible for distinguishing between similar signals and making decisions about them appear to generate characteristic and identifiable electrical waves. Some theoretical speculation about these data are introduced with the aim of generating a more heuristic model of the functioning brain. Author

N75-27743*# California Univ., La Jolla. Dept. of Neurosciences.
ELECTROPHYSIOLOGICAL MEASUREMENT OF HUMAN AUDITORY FUNCTION
Robert Galambos [1975] 26 p refs Sponsored by NASA and NIH
(NASA-CR-143136) Avail: NTIS HC $3.75 CSCL 06P

Knowledge of the human auditory evoked response is reviewed, including methods of determining this response, the way particular changes in the stimulus are coupled to specific changes in the response, and how the state of mind of the listener will influence the response. Important practical applications

of this basic knowledge are discussed. Measurement of the brainstem evoked response, for instance, can state unequivocally how well the peripheral auditory apparatus functions. It might then be developed into a useful hearing test, especially for infants and preverbal or nonverbal children. Clinical applications of measuring the brain waves evoked 100 msec and later after the auditory stimulus are undetermined. These waves are clearly related to brain events associated with cognitive processing of acoustic signals, since their properties depend upon where the listener directs his attention and whether how long he expects the signal. Author

N75-27744*# California Univ., La Jolla. Dept. of Neuroscience.
ON HEMISPHERIC DIFFERENCES IN EVOKED POTENTIALS TO SPEECH STIMULI
Robert Galambos, Peter Benson, Timothy S. Smith, Carol Schulman-Galambos, and Helen Osier [1975] 11 p refs
(Grants NGR-05-009-198; HD-08694; NS-11735)
(NASA-CR-143137) Avail: NTIS HC $3.25 CSCL 06P

Confirmation is provided for the belief that evoked potentials may reflect differences in hemispheric functioning that are marginal at best. Subjects were right-handed and audiologically normal men and women, and responses were recorded using standard EEG techniques. Subjects were instructed to listen for the targets while laying in a darkened sound booth. Different stimuli, speech and tone signals, were used. Speech sounds were shown to evoke a response pattern that resembles that to tone or clicks. Analysis of variances on peak amplitude and latency measures showed no significant differences between hemispheres, however, a Wilcoxon test showed significant differences in hemispheres for certain target tasks. Author

N75-27745*# California Univ., La Jolla. Dept. of Neurosciences.
STIMULUS NOVELTY, TASK RELEVANCE AND THE VISUAL EVOKED POTENTIAL IN MAN
Eric Courchesne, Steven A. Hillyard, and Robert Galambos [1975] 37 p refs
(Grants NGR-05-009-198)
(NASA-CR-143139) Avail: NTIS HC $3.75 CSCL 06P

The effect of task relevance on P3 (waveform of human evoked potential) waves and the methodologies used to deal with them are outlined. Visual evoked potentials (VEPs) were recorded from normal adult subjects performing in a visual discrimination task. Subjects counted the number of presentations of the numeral 4 which was interposed rarely and randomly within a sequence of tachistoscopically flashed background stimuli. Intrusive, task-irrelevant (not counted) stimuli were also interspersed rarely and randomly in the sequence of 2s; these stimuli were of two types: simples, which were easily recognizable, and novels, which were completely unrecognizable. It was found that the simples and the counted 4s evoked posteriorly distributed P3 waves while the irrelevant novels evoked large, frontally distributed P3 waves. These large, frontal P3 waves to novels were also found to be preceded by large N2 waves. These findings indicate that the P3 wave is not a unitary phenomenon but should be considered in terms of a family of waves, differing in their brain generators and in their psychological correlates. Author

N75-27746*# California Univ., La Jolla. Dept. of Psychology and Neurosciences.
LOUDNESS ENHANCEMENT: MONAURAL, BINAURAL AND DICHOTIC
Robert O. Elmasian and Robert Galambos [1975] 28 p refs
(Grants NGR-05-009-198)
(NASA-CR-143138) Avail: NTIS HC $3.75 CSCL 06P

It is shown that when one tone burst precedes another by 100 msec variations in the intensity of the first systematically influences the loudness of second. When the first burst is more intense than the second, the second is increased and when the first burst is less intense, the loudness of the second is decreased. This occurs in monaural, binaural and dichotic paradigms of signal presentation. Where both bursts are presented to the same ear there is more enhancement with less intersubject variability than when they are presented to different ears. Monaural enhancements as large as 30 db can readily be demonstrated, but decrements rarely exceed 5 db. Possible physiological mechanisms are discussed for this loudness enhancement, which apparently shares certain characteristics with time-order-error, assimilation, and temporal partial masking experiments. Author

N75-27747*# Methodist Hospital, Houston, Tex.
SKYLAB SLEEP MONITORING EXPERIMENT (EXPERIMENT M133) Final Report
James D. Frost, Jr. (Baylor Coll. of Medicine, Houston) 31 Jan. 1975 142 p refs
(Contract NAS9-12974)
(NASA-CR-141886) Avail: NTIS HC $5.75 CSCL 06S

A summary of the conceptual design of the Skylab sleep monitoring experiment and a comprehensive compilation of the data-analysis results from the three Skylab missions is presented. One astronaut was studied per flight, electroencephalographic, electro-oculographic, and headmotion signals acquired during sleep by use of an elastic recording cap containing sponge electrodes and an attached miniature preamplifier/accelerometer unit are shown. A control-panel assembly, mounted in the sleep compartment, tested electrodes, preserved analog signals, and automatically analyzed data in real time (providing a telemetered indication of sleep stage). Results indicate that men are able to obtain adequate sleep in regularly scheduled eight-hour rest periods during extended space missions. Author

N75-27748# California Univ., San Diego. Dept. of Psychology and Neurosciences.
LOUDNESS ENHANCEMENT IN MAN. 1: BRAINSTEM EVOKED RESPONSE CORRELATES
J. W. Bauer, R. O. Elmasian, and R. Galambos [1975] 22 p refs
Avail: NTIS HC $3.25

Electrophysiological responses and psychophysical judgements in subjects performing in a loudness enhancement task were correlated. Subjects received a tone burst followed after an interval by a signal whose loudness they were required to match by adjusting the intensity of another signal presented 1.5 seconds later. They judged the loudness of the first signal to be enhanced by 15db or more when the interval was small. Analysis of the electrophysiological brainstem responses evoked by both signals revealed no changes in the electrophysiological response to the first signal that could explain its loudness enhancement. Results show the brainstem response to reflect stimulus intensity changes accurately, and perceived (enhanced) loudness change poorly or not at all. It appears that the mechanisms mediating loudness enhancement operate at levels central to the brainstem. Author

N75-27749# Saint Louis Univ., Mo. Dept. of Physiology.
THE INFLUENCE OF POSTURE ON ISOMETRIC STRENGTH AND ENDURANCE FOREARM BLOOD FLOW, AND THE BLOOD PRESSURE AND HEART RATE RESPONSE TO ISOMETRIC EXERCISE Interim Report, 1 Jun. 1973 - 31 May 1974
A. R. Lind, R. L. Burse, J. S. Petrofsky, J. S. Rinehart, and P. G. Schmid 7 Oct. 1974 22 p refs
(Grant AF-AFOSR-2362-72; AF Proj. 9777)
(AD-A004332; AFOSR-75-0086TR) Avail: NTIS CSCL 06/16

The influence of posture on isometric muscular capacity has been examined on four subjects in the sitting, 45 degrees head-up, recumbent and 15 degrees head-down position. The maximal voluntary contraction (MVC) of the subjects: hand-grip was unaffected by posture, but the endurance time of an isometric contraction held to fatigue at 40% MVC was 20% longer in the sitting than in any other posture. That difference in endurance was abolished when the circulation to the exercising forearm was occluded. The blood flow to the forearm was found to be higher at rest before and after isometric contractions in the recumbent subjects than when they were sitting, but during the contractions, the reverse was true and the forearm blood flow was greater when seated than when recumbent. GRA

N75-27750# Woodard Research Corp., Herndon, Va.
INDUSTRY SURVEY OF TEST METHODS OF POTENTIAL HEALTH HAZARD
Geoffrey Woodard Nov. 1974 96 p refs Prepared for EPA, Washington, D. C.
(PB-239840; EPA-560/5) Avail: NTIS HC $4.75 CSCL 06T

Nine companies selected as representing a cross section of prominent producers of chemicals identified through four-digit Standard Industrial Classification codes were surveyed with respect to methods used to assess toxicological and environmental properties of new and existing chemicals. Four progressive levels of investigational effort depending upon extent, frequency, and nature of chemical use are identified: single or infrequent exposure; occasional low-level exposure; frequent low-level, occasional high-level exposures; and frequent high-level, general consumer, unavoidable exposures. Factors influencing the decisions regarding the level(s) of investigation needed or the initiation of the next higher level series of studies are explored.
Author (GRA)

N75-27751# Control Data Corp., Arlington, Va. Engineering Management Operations.
ASSESSMENT OF RURAL HEATH RESEARCH: EXECUTIVE SUMMARY
G. Singleton and S. Wyban Mar. 1975 54 p refs
(Contract AG-12-01-01-5-510)
(PB-240271/7; CDC/EMO-74/01) Avail: NTIS HC$4.25 CSCL 06E
Problems and possible solutions in the area of rural health research and development are presented. GRA

N75-27689 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
THE TRANSMISSION OF ANGULAR ACCELERATION TO THE HEAD IN THE SEATED HUMAN SUBJECT
G. R. Barnes and B. H. Rance *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

N75-27692 Centre d'Essais en Vol, Bretigny-sur-Orge (France). Lab. de Medecine Aerospatiale.
ACTION OF LOW VIBRATION FREQUENCIES ON THE CARDIOVASCULAR SYSTEM OF MAN [ACTION DES VIBRATIONS DE BASSES FREQUENCES SUR LE SYSTEME CARDIO-VASCULAIRE DE L'HOMME]
J. Demange, R. Auffret, and B. Vettes *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 5 p refs In FRENCH (For availability see N75-27685 18-51)

N75-27694 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
LABORATORY STUDIES ON CHRONIC EFFECTS OF VIBRATION EXPOSURE
D. V. Sturges, D. W. Badger (Natl. Inst. for Occupational Safety and Health, Cincinnati), R. N. Slarve, and D. E. Wasserman (Natl. Inst. for Occupational Safety and Health, Cincinnati) *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 2 p refs (For availability see N75-27685 18-51)

N75-27695 National Inst. for Occupational Safety and Health, Cincinnati, Ohio.
SERUM AND URINE CHANGES IN MACACA MULATTA FOLLOWING PROLONGED EXPOSURE TO 12 Hz, 1.5 g VIBRATION
D. W. Badger, D. V. Sturges (Aerospace Med. Res. Lab.), R. N. Slarve (Aerospace Med. Res. Lab.), and D. E. Wasserman *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 3 p refs (For availability see N75-27685 18-51)

N75-27696 Centre d'Essais en Vol, Bretigny-sur-Orge (France). Lab. de Medecine Aerospatiale.
RAPID FLIGHT VIBRATION PHENOMENA AND SPINE FRACTURES [PHENOMENES VIBRATOIRES RAPIDES EN VOL ET FRACTURES DU RACHIS]
R. Auffret, R. P. Delahaye, and J. Salvagniac *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 5 p refs In FRENCH (For availability see N75-27685 18-51)

N75-27697 Army Aeromedical Research Lab., Fort Rucker, Ala.
EFFECTS OF VIBRATION ON THE MUSCULOSKELETAL SYSTEM
Walter M. Braunohler *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

N75-27698 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
THE RESPIRATORY AND METABOLIC EFFECTS OF CONSTANT AMPLITUDE WHOLE-BODY VIBRATION IN MAN
G. R. Sharp, G. A. Patrick, and W. R. Withey *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 6 p refs (For availability see N75-27685 18-51)

N75-27701 Dayton Univ. Research Inst., Ohio.
PERFORMANCE AND PHYSIOLOGICAL EFFECTS OF COMBINED STRESS INCLUDING VIBRATION
J. C. Guignard *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 6 p refs (For availability see N75-27685 18-51)

N75-27702 Medical Research Council, Cambridge (England).
EFFECTS OF DURATION OF VERTICAL VIBRATION BEYOND THE PROPOSED ISO "FATIGUE-DECREASED PROFICIENCY" TIME, ON THE PERFORMANCE OF VARIOUS TASKS
R. T. Wilkinson and R. Gray (RAE, Farnborough, England) *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 5 p refs (For availability see N75-27685 18-51)

N75-27706 Kentucky Univ., Lexington.
MODELS OF THE CARDIOVASCULAR SYSTEM UNDER WHOLE BODY VIBRATION STRESS
Charles F. Knapp *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 13 p refs (For availability see N75-27685 18-51)

N75-27708 Advisory Group for Aeronautical Research and Development, Paris (France).
THE ISO GUIDE FOR THE EVALUATION OF HUMAN WHOLE BODY VIBRATION EXPOSURE
G. Bobbert *In its* Vibration and Combined Stresses in Advan. Systems Mar. 1975 6 p refs (For availability see N75-27685 18-51)

N75-27709 Royal Aircraft Establishment, Farnborough (England). Human Engineering Div.
PROPOSED LIMITS FOR EXPOSURE TO WHOLE BODY VERTICAL VIBRATION, 0.1 TO 1.0 Hz
Geoff Allen *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 11 p refs (For availability see N75-27685 18-51)

N75-27711 Centre de Recherches de Medecine Aeronautique, Paris (France).
STUDY OF MAN'S PHYSIOLOGICAL RESPONSE TO EXPOSURE TO INFRA-SOUND LEVELS OF 130 dB [ETUDE CHEZ L'HOMME DES EFFETS PHYSIOLOGIQUES D'UNE EXPOSITION A DES NIVEAUX INFR-SONORES DE 130 DB]
P. Borredon, J. Nathie, and A. Gibert *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 13 p refs In FRENCH (For availability see N75-27685 18-51)

N75-27712 Centre de Recherches de Medecine Aeronautique, Paris (France).
EFFECT OF LOW FREQUENCY AERIAL VIBRATIONS ON NOCTURNAL ACTIVITY OF A RAT [EFFET D'UNE EXPOSITION A DES VIBRATIONS AERIENNES DE BASSE FREQUENCE SUR L'ACTIVITE NOCTURNE DU RAT]
P. Pesquies and J. Nathie *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 4 p refs In FRENCH (For availability see N75-27685 18-51)

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N75-27752 British Library Lending Div., Boston Spa (England).
ON RANDOM AND TARGET-ORIENTED SEARCH
E. V. Oganesyan, L. S. Gambaryan, V. S. Artyunyan, and V. G. Abovyan Dec. 1974 8 p refs Transl. into ENGLISH from Biol. Zh. Arm. (Erevan), v. 24, no. 3, 1971 p 19-23
(BLL-RTS-9493) Avail: British Library Lending Div., Boston Spa, Engl.: £1.40; 2 BLL photocopy coupons

Strategies of the cognitive process are discussed in terms of the use of natural search mechanisms in the development of applied control algorithms. Search strategies considered include: target-oriented search and random search. J.M.S.

N75-27753# National Aviation Facilities Experimental Center, Atlantic City, N.J.
OCULOMETER MEASUREMENT OF AIR TRAFFIC CONTROLLER VISUAL ATTENTION Interim Report, Jul. - Aug. 1974
Gloria Karsten, Bernard Goldberg, Richard Rood, and Richard Sulzer Feb. 1975 27 p refs
(AD-A006965; FAA-NA-74-61) Avail: NTIS CSCL 05/5

To evaluate the oculometer as a visual fixation measuring device for man/machine interface investigations, six air traffic controllers performed simulated radar control functions. A seventh controller performed the control tasks, while both an oculometer record and a manual record were made of visual attention. Approximately 80% of the test time was spent looking at the radar screen, while much less was spent on other instruments and miscellaneous objects. Good agreement was shown between the data obtained by each method, but the oculometer was more capable of recording brief eye movements and additional detail. This additional precision was accompanied, however, by an additional workload in data reduction. It was concluded that the oculometer has the potential to produce reliable and accurate information when used within the limits of its design. The addition of automatic output of fixation coordinates would be a valuable improvement resulting in reduced test workload. Author

N75-27754# New Mexico Univ., Albuquerque. Dept. of Electrical Engineering and Computer Science.
TWO PROGRAMS FOR SPEECH RECOGNITION AND SYSTEM IDENTIFICATION RESEARCH Interim Report
J. T. Cordaro Aug. 1974 29 p refs
(Grant AF-AFOSR-2178-72; AF Proj. 9769)
(AD-A003806; EE-223(74)AFOSR-222-3) Avail: NTIS CSCL 05/7

Two programs used for research in automatic speech recognition and in system identification are described in this report. GRA

N75-27755# School of Aerospace Medicine, Brooks AFB, Tex.
AN AUTOMATED SYSTEM TO ASSESS PILOT PERFORMANCE IN A LINK GAT-1 TRAINER Final Report, Mar. 1971 - May 1972
Peter H. Henry, Roy A. Turner, and Robert B. Matthie Oct. 1974 69 p refs
(AF Proj. 7930)
(AD-A004780; SAM-TR-74-41) Avail: NTIS CSCL 05/9

A prototype control and scoring system has been developed around the Link GAT-1 trainer that permits laboratory assessment of pilot performance. This system automatically presents subjects with an hour-long series of maneuver requests providing a laboratory approximation of a cross-country flight on instruments in a single-engine light aircraft. Performance is scored electronically in terms of how closely subjects are able to stay within the tolerances prescribed for various flight instruments as they execute the series of maneuvers. Major components of this non-computer based system are: (1) two Link GAT-1 trainers; (2) special display panels mounted in the cockpit of each trainer; (3) a central control station; (4) an assembly of special-purpose analog and digital logic for error detection and scoring; and (5) paper tape perforators for data logging. This report covers the basic design and circuitry details. Results of performance tests using this system are reported elsewhere. GRA

N75-27756# Arizona State Univ., Tempe. Dept. of Educational Technology.
MEASUREMENT OF FLIGHT PERFORMANCE IN A FLIGHT SIMULATOR Interim Report
Brian D. Shipley, Vernon S. Gerlack, and Fritz H. Brecke Aug. 1974 147 p refs
(Grant AF-AFOSR-2128-71; AF Proj. 9778)
(AD-A004488; TR-40830; AFOSR-75-0208TR) Avail: NTIS CSCL 05/9

Performance evaluation is an essential part of effective instructional research. The evaluation of complex psycho-motor performances is difficult because they are typically transitory; there is no permanent record, trace, or product after the performance is completed to indicate the characteristics of the performance. The performance of student pilots in the flight simulator or in the aircraft exemplifies the difficulties stemming from the complexity of the task and from the transitory nature of performance transiency. This report describes the results of a methodological study carried out to solve these problems for the purpose of evaluating student pilot performance in a flight simulator. GRA

N75-27757# Arizona State Univ., Tempe. Dept. of Educational Technology.
CUES, FEEDBACK, AND TRANSFER IN UNDERGRADUATE PILOT TRAINING, PHASE 3
Vernon S. Gerlach Oct. 1974 20 p
(Grant AF-AFOSR-2128-71)
(AD-A003748; AFOSR-74-1894TR) Avail: NTIS CSCL 05/9

Three related lines of endeavor are reported. Central to all activity was continued research concerning the effect of cues and feedback on transfer type tasks. Because questions arose on the effect of practice during the cognitive pre-training phase of skill acquisition, an experiment was designed to study this variable. A second research thrust was the continued effort to discover more effective and efficient methods of measuring student pilot flight performance. The third line of research centered on the study of algorithms as a tool for the instructional designer whose responsibility it is to improve flying training procedures and techniques. GRA

N75-27688 Surface Effects Ship Project Office, Bethesda, Md.
CREW PERFORMANCE REQUIREMENTS IN THE VIBRATION ENVIRONMENTS OF SURFACE EFFECT SHIPS
Alfred Skolnick *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 22 p refs (For availability see N75-27685 18-51)

N75-27690 Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.
THE EFFECT OF THE INDIVIDUAL AND COMBINED STRESSES OF VIBRATION AND SUSTAINED G ON PILOT PERFORMANCE
A. G. Piranian *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 13 p refs (For availability see N75-27685 18-51)

N75-27699 Southampton Univ. (England). Human Factors Research Unit.
A STUDY OF VIBRATION, PILOT VISION AND HELICOPTER ACCIDENTS
Michael J. Griffin *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 16 p refs (For availability see N75-27685 18-51)

N75-27700 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
MECHANISMS OF VIBRATION EFFECTS ON AIRCREW PERFORMANCE
Richard W. Shoenberger *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 9 p refs (For availability see N75-27685 18-51)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N75-27758* National Aeronautics and Space Administration. Pasadena Office, Calif.
COOPERATIVE MULTIAXIS SENSOR FOR TELEOPERATION OF ARTICLE MANIPULATING APPARATUS Patent
Alan R. Johnston, inventor (to NASA) (JPL) Issued 10 Jun. 1975 10 p Filed 31 May 1973 Sponsored by NASA
(NASA-Case-NPO-13386-1; US-Patent-3,888,362;
US-Patent-Appl-AN-475336; US-Patent-Class-214-1B;
US-Patent-Class-214-1CM; US-Patent-Class-318-640) Avail: US Patent Office CSCL 05H

Apparatus for grasping an article under remote control is provided with a sensor comprised of a photodetecting cell divided into four quadrants to define X and Y coordinates and a light emitting diode on a Z axis normal to the X and Y axes. Two additional light emitting diodes are equally spaced on each side of the first diode along the X axis of the sensor. The diodes are sequentially energized and images of the diodes are reflected by a target comprising two plane mirrors and a corner retroreflector mounted on the article to produce signals from the cells which, when combined and nulled, will align X, Y, and Z axes of the sensor with corresponding axes Xm, Ym and Zm of the target, and also decrease the distance between the sensor and the mirror to a predetermined value.
Official Gazette of the U.S. Patent Office

N75-27759* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MULTIPARAMETER VISION TESTING APPARATUS Patent
Stacy R. Hunt, Jr. (GE, Philadelphia), Robert J. Homkes (GE, Philadelphia), Wilmer B. Poteate (GE, Philadelphia), and Andrew C. Sturgis, inventors (to NASA) (GE, Philadelphia) Issued 24 Jun. 1975 23 p Filed 10 Sep. 1973 Supersedes N74-32549 (12 - 22, p 2651) Continuation-in-Part of Abandoned US Patent Appl. SN-160371, filed 7 Jul. 1971 Sponsored by NASA
(NASA-Case-MSC-13601-2; US-Patent-3,891,311;
US-Patent-Appl-SN-395495; US-Patent-Class-351-38) CSCL 06B

Compact vision testing apparatus is described for testing a large number of physiological characteristics of the eyes and visual system of a human subject. The head of the subject is inserted into a viewing port at one end of a light-tight housing containing various optical assemblies. Visual acuity and other refractive characteristics and ocular muscle balance characteristics of the eyes of the subject are tested by means of a retractable phoroptor assembly carried near the viewing port and a film cassette unit carried in the rearward portion of the housing (the latter selectively providing a variety of different visual targets which are viewed through the optical system of the phoroptor assembly). The visual dark adaptation characteristics and absolute brightness threshold of the subject are tested by means of a projector assembly which selectively projects one or both of a variable intensity fixation target and a variable intensity adaptation test field onto a viewing screen located near the top of the housing. Official Gazette of the U.S. Patent Office

N75-27760* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
REFERENCE APPARATUS FOR MEDICAL ULTRASONIC TRANSDUCER Patent
Robert D. Lee, Robert J. Hudock, and Dale I. Shute, inventors (to NASA) Issued 8 Jul. 1975 8 p Filed 21 Dec. 1973 Supersedes N74-13818 (12 - 05, p 0499)
(NASA-Case-ARC-10753-1; US-Patent-3,893,449;
US-Patent-Appl-SN-427395; US-Patent-Class-128-2V;
US-Patent-Class-74-471XY; US-Patent-Class-128-2.05Z;
US-Patent-Class-128-24A) Avail: US Patent Office CSCL 06B

A portable miniature ultrasonic transducer positioning apparatus is described; the apparatus has a transducer receiving sleeve coupled to a pair of orthogonally orientated, independently pivotable yokes. The yokes are pivotably mounted to a base member. A pair of potentiometers are coupled to the axes of the yokes and to a dual meter sleeve position indicator for indicating, with respect to the axes of the yokes, the angular position of a probe slidably fitted in the sleeve. An oscilloscope or similar signal display device is coupled to the probe for providing signal readout for use in ultrasonic cardiology oscilloscope studies. As an option, a ball lever assembly is provided for remotely controlling yoke position and the angular position of the sleeve and a probe fitted to it.
Official Gazette of the U.S. Patent Office

N75-27761* National Aeronautics and Space Administration. Pasadena Office, Calif.
HEAT STERILIZABLE PATIENT VENTILATOR Patent
Alexander S. Irons (JPL), Paul P. Muehter (JPL), and Willie D. Kent, inventors (to NASA) (JPL) Issued 8 Jul. 1975 9 p Filed 7 Mar. 1974 Supersedes N74-17858 (12 - 09, p 1019) Sponsored by NASA
(NASA-Case-NPO-13313-1; US-Patent-3,893,458;
US-Patent-Appl-SN-449153; US-Patent-Class-128-145.8;
US-Patent-Class-55-DIG.35) Avail: US Patent Office CSCL 06B

An improved heat-sterilizable patient ventilator is disclosed. The device is characterized by a ported center-body, a shell formed of heat sterilizable material mounted on the center-body and defining a hermetically sealed reservoir for confining under positive pressure a mixture of bacteria-free gas, and a pneumatic circuit including an oxygen delivery jet coupled with an absolute filtration system for delivering bacteria-free mixture of gases to the reservoir. Official Gazette of the U.S. Patent Office

N75-27762*# IIT Research Inst., Chicago, Ill. Techno/Economic Studies Group.
MARKET STUDY: BIOLOGICAL ISOLATION GARMENT
May 1975 16 p ref
(Contract NASw-2645)
(NASA-CR-144350) Avail: NTIS HC $3.25 CSCL 06K

The biological isolation garment was originally designed for Apollo astronauts to wear upon their return to earth from the moon to avoid the possibility of their contaminating the environment. The concept has been adapted for medical use to protect certain patients from environmental contamination and the risk of infection. The nature and size of the anticipated market are examined with certain findings and conclusions relative to clinical acceptability and potential commercial viability of the biological isolation garment. Author

N75-27763*# Scientific Translation Service, Santa Barbara, Calif.
THE INTERNATIONAL ORBITAL LABORATORY
L. S. Khachaturyants Washington NASA Jul. 1975 16 p Transl. into ENGLISH from Zemlya Vselennaya (USSR), no. 2, Mar. - Apr. 1975 p 14-20
(Contract NASw-2483)
(NASA-TT-F-16442) Avail: NTIS HC $3.25 CSCL 06S

The problems encountered in space flights such as visual signalling, contrast sensitivity, and motor reactions are discussed. The psychophysiological mechanisms are described, and the problems to be solved in the Apollo-Soyuz flight are analyzed.
Author

N75-27764# Royal Aircraft Establishment, Farnborough (England).
THE DRIVING SEAT. ITS ADAPTATION TO FUNCTIONAL AND ANTHROPOMETRIC REQUIREMENTS
R. Rebiffe May 1975 22 p refs Transl. into ENGLISH from the French
(RAE-Lib-Trans-1841; BR48031) Avail: NTIS HC $3.25

The relationship of the drivers seat with the various functions to be carried out from the driving position was considered. The study included: (1) analysis of the drivers task, (2) determination of the body posture which best meets the task requirements, and (3) definition of the seat characteristics giving optimum support to the driver in this posture. The main characteristics of the seat obtained were the seating height, the location and extent of the adjustment zone, the seat back inclination, the cushion inclination, and the static consistency of the cushion.
Author

N75-27765*# Scientific Translation Service, Santa Barbara, Calif.
THE SPACE WATCH IN SALYUT AS ON THE EARTH
N. Zheleznov Washington NASA Jul. 1975 6 p Transl. into ENGLISH from Gudok (USSR), 9 Jul. 1975 p 4
(Contract NASw-2483)
(NASA-TT-F-16468) Avail: NTIS HC $3.25 CSCL 06S

Medical-biological experiments carried out onboard Salyut space station are described. The equipment used to train the cosmonauts is briefly discussed. Author

N75-27766# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
EVALUATION OF A WATER-COOLED HELMET LINER Final Report, Mar. - Jun. 1974
Abbott T. Kissen, Willi J. Buehring, Robert D. ODonnell, Walter C. Summers, and David C. Smedley Nov. 1974 28 p refs (AF Proj. 7222)
(AD-A004776; AMRL-TR-74-135) Avail: NTIS CSCL 06/17

Five subjects completed four 80 minute heat exposures (46C (115F), 40% relative humidity), twice wearing the water-cooled helmet liner and twice without for a total of 20 heat exposures. During the thermal exposure, the subjects accomplished psychomotor performance tests. Physiological measurements included mean skin, rectal, and body temperatures, mean heart rate, body heat storage, sweat loss, and Physiologic Index of Strain. The performance measurements included tracking, mental arithmetic, visual-motor response time, and auditory differentiation tasks. Head cooling significantly reduced the magnitude of all the physiological responses. The effect of head cooling on psychomotor performance was less impressive. The overall results indicate a lack of performance decrement as a result of the heat loads used here and no differential effect of head cooling on a subject's performance. GRA

N75-27767# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
BREATHING AIR QUALITY UNDER THE FIRE PROXIMITY SUIT HOOD Final Report, 29 Nov. 1973 - Jun. 1974
Abbott T. Kissen, Walter C. Summers, Willi J. Buehring, and David C. Medley Nov. 1974 14 p refs
(AD-A004770; AMRL-TR-74-76) Avail: NTIS CSCL 06/17

Four subjects, wearing the fire fighters proximity suit (except for gloves) were exposed to low and moderate exercise regimens on a treadmill. These exercise levels plus a resting condition were combined with auxiliary air ventilation flow rates of 5 or 10 liters/minute and nonventilated conditions. A continuous sample of the breathing atmosphere under the hood was evaluated for CO2 and O2 content throughout the ten minute exposure periods. The increases in heart rate are solely related to the level of exercise and were not influenced by the presence or magnitude of auxiliary air ventilation. Under the most severe conditions of this study, O2 and CO2 values did not attain levels of clinical significance. Increased activity in operational situations is a distinct possibility and CO2 levels could be elevated an additional 2-3% generating undesirable symptoms. The added weight and cost penalties of an auxiliary air ventilation system must be balanced against the possible development of an undesirable breathing environment of questionable operational significance. GRA

N75-27768# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
A MECHANICAL ARM CONTROL SYSTEM
Richard C. Waters Jan. 1974 43 p
(Contract N00014-70-A-0362-0005)
(AD-A004672; AI-M-301) Avail: NTIS CSCL 06/4

The paper describes a system for controlling the motion of a mechanical manipulator primarily through software rather than hardware. In addition, much attention is paid to what characteristics such a system should have, so that the manipulator can be conveniently directed to perform complex tasks. GRA

N75-27686 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
AIRCREW ASSESSMENT OF THE VIBRATION ENVIRONMENT IN HELICOPTERS
B. H. Rance and J. W. Chappelow *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

N75-27687 Max-Planck-Institut fuer Landarbeit und Landtechnik, Bad Kreuznach (West Germany).
HUMAN EXPOSURE TO WHOLE-BODY VIBRATION IN MILITARY VEHICLES AND EVALUATION BY APPLICATION OF ISO/DIS 2631
Heinrich Dupuis *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

N75-27691 Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Acceleration Physiology Dept.
EFFECTS OF TRANSIENT VIBRATIONS ON HUMAN SAFETY AND PERFORMANCE
Lorenz H. Vogt *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 10 p refs (For availability see N75-27685 18-51)

N75-27703 Advisory Group for Aeronautical Research and Development, Paris (France).
PERIPHERAL VISION ARTIFICIAL HORIZON DISPLAY
R. Malcolm, K. E. Money, and P. Anderson *In its* Vibration and Combined Stresses in Advan. Systems Mar. 1975 3 p ref (For availability see N75-27685 18-51)

N75-27704 Federal Inst. for Occupational Safety and Accident Research, Dortmund (West Germany).
A REVIEW OF BIOMECHANICAL MODELS FOR THE EVALUATION OF VIBRATION STRESS
Wolfgang Lange *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 8 p refs (For availability see N75-27685 18-51)

N75-27705* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AN ELEMENTARY PSYCHOPHYSICAL MODEL TO PREDICT RIDE COMFORT IN THE COMBINED STRESS OF MULTIPLE DEGREES OF FREEDOM
Ralph W. Stone, Jr. *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

N75-27707 Systems Technology, Inc., Hawthorne, Calif.
EVALUATING BIODYNAMIC INTERFERENCE WITH OPERATIONAL CREWS
Henry R. Jex and R. Wade Allen *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 18 p refs (For availability see N75-27685 18-51)

N75-27710 Boeing Co., Wichita, Kans.
RIDE QUALITY OF CREW MANNED MILITARY AIRCRAFT
Stanley H. Brumaghim *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 7 p refs (For availability see N75-27685 18-51)

N75-27713 Erlangen-Nuremberg Univ. (West Germany).
VIBRATESE LANGUAGE
Wolf D. Keidel *In* AGARD Vibration and Combined Stresses in Advan. Systems Mar. 1975 9 p refs (For availability see N75-27685 18-51)

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N75-27769# Joint Publications Research Service, Arlington, Va.
OPTICAL AND ELECTROOPTICAL DATA PROCESSING
B. S. Sotskov, ed. 6 Jun. 1974 18 p refs Transl. into ENGLISH from the book "Opticheskaya i Elektrooptricheskaya Obrabotka Informatsii" Moscow, Izdatelstvo Nauka, 1974 p 4-6, 66-75, 146-149
(JPRS-64938) Avail: NTIS HC $3.25

Information on optical and electrooptical ways and means of transmitting, converting, processing and storing information are presented. For individual titles, see N75-27770 through N75-27772.

N75-27770 Joint Publications Research Service, Arlington, Va.
OPTOELECTRONIC PATTERN RECOGNITION DEVICE **c63**
A. A. Aleksandrov, R. I. Polonnikov, and Ye. I. Trofimov *In* Its Opt. and Electroopt. Data Process. (JPRS-64938) 6 Jun. 1975 p 3-8 refs Transl. into ENGLISH from the book "Opticheskaya i Elektrooptricheskaya Obrabotka Informatsii Moscow, Izdatelstvo Nauka 1974 p 66-71 (For availability see N75-27769 18-59)

A spectrum analyzer for signal processing in data systems, using emitted light and employing gallium arsenides for photoreceptors and emitters is presented. Liquid crystals are also utilized for materials. Matrices calculations, in particular, the Hadamard matrix, are included. Diagrams and models are also shown.
J.R.T.

N75-27771 Joint Publications Research Service, Arlington, Va.
DESIGN FEASIBILITY OF OPTRON WITH CONTROLLED OPTICAL CHANNEL **c60**
I. F. Polyakova and N. P. Udalov *In its* Opt. and Electroopt. Data Process. (JPRS-64938) 6 Jun. 1975 p 9-13 Transl. into ENGLISH from the book "Opticheskaya i Elektrooptricheskaya Obrabotka Informatsii" Moscow, Izdatelstovo Nauka, 1974 p 71-75 (For availability see N75-27769 18-59)

A device to control radiant flux on photoreceivers (which carry information) for data systems is described. The device can be used to design logic circuits and data input systems for computers. Various theoretical aspects of electro-optics are discussed pertaining to light modulation methods. J.R.T.

N75-27772 Joint Publications Research Service, Arlington, Va.
SOME ASPECTS OF THE DESIGN OF OPTRON WITH FIBER LIGHT GUIDE **c74**
T. N. Tischenko *In its* Opt. and Electroopt. Data Process. (JPRS-64938) 6 Jun. 1975 p 14-17 ref Transl. into ENGLISH from the book "Opticheskaya i Elektrooptricheskaya Obrabotka Informatsii" Moscow, Izdatelstvo Nauka, 1974 p 146-149 (For availability see N75-27769 18-59)

The optical parameters for an instrument to be used in data systems are discussed. Various theoretical aspects (such as Snells law) are considered. J.R.T.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering*.

N75-27773 Maryland Univ., College Park.
THE ARCHITECTURE OF AN ALGOL 60 COMPUTER Ph.D. Thesis
Leonard Stanley Haynes 1974 238 p
Avail: Univ. Microfilms Order No. 75-15776

The architecture of a hardware Algol 60 language processor is described. The computer's high level polish string internal language, storage structure, and processor and control structure were designed to reflect the syntax, data structure, and semantics of the source language, Algol 60 (excluding only own and string variables). Specific aspects of the translation and execution tasks are implemented by separate, simultaneously operating parallel processors, each optimized to its specific function, and to the syntax, data structure, and semantics of Algol 60. The architecture of the Algol 60 computer contains innovations which help improve the performance of this processor over other hardware of software language processors. These innovations result in faster processing, smaller storage requirements, more meaningful diagnostics, lower relative cost, clearer design documentation, and more easily learned and understood operation than other systems. Dissert. Abstr.

N75-27774*# Notre Dame Univ., Ind. Dept. of Electrical Engineering.
SYNDROME SOURCE CODING AND ITS UNIVERSAL GENERALIZATION
Teofilo C. Ancheta, Jr. 17 Jul. 1975 16 p refs
(Grant NsG-5025)
(NASA-CR-143102; EE-755) Avail: NTIS HC $3.25 CSCL 09B

A method of using error-correcting codes to obtain data compression, called syndrome-source-coding, is described in which the source sequence is treated as an error pattern whose syndrome forms the compressed data. It is shown that syndrome-source-coding can achieve arbitrarily small distortion with the number of compressed digits per source digit arbitrarily close to the entropy of a binary memoryless source. A universal generalization of syndrome-source-coding is formulated which provides robustly-effective, distortionless, coding of source ensembles. Author

N75-27775*# Notre Dame Univ., Ind. Dept. of Electrical Engineering.
SHORT, UNIT-MEMORY, BYTE-ORIENTED, BINARY CONVOLUTIONAL CODES HAVING MAXIMAL FREE DISTANCE
Lin-Nan Lee 11 Jul. 1975 12 p refs
(Grant NsG-5025)
(NASA-CR-143100; EE-754) Avail: NTIS HC $3.25 CSCL 09B

It is shown that (n sub 0, k sub 0) convolutional codes with unit memory always achieve the largest free distance among all codes of the same rate k sub 0/n sub 0 and same number 2MK sub 0 of encoder states, where M is the encoder memory. A unit-memory code with maximal free distance is given at each place where this free distance exceeds that of the best code with k sub 0 and n sub 0 relatively prime, for all Mk sub 0 less than or equal to 6 and for R = 1/2, 1/3, 1/4, 2/3. It is shown that the unit-memory codes are byte-oriented in such a way as to be attractive for use in concatenated coding systems. Author

N75-27776*# Boeing Aerospace Co., Seattle, Wash. Research and Engineering Div.
SSME STRUCTURAL COMPUTER PROGRAM DEVELOPMENT: BOPACE PROGRAMMER MANUAL
15 Apr. 1975 91 p
(Contract NAS8-30615)
(NASA-CR-143892; D5-17266-4) Avail: NTIS HC $4.75 CSCL 09B

The programming manual for the two-dimensional Boeing Plastic Analysis Capability for Engines (BOPACE) program written in FORTRAN IV is presented. The BOPACE flow logic is summarized along with subroutines and input/output files. Emphasis is placed on linear equation solver routines written as an independent package. J.M.S.

N75-27777*# Boeing Aerospace Co., Seattle, Wash. Research and Engineering Div.
SSME STRUCTURAL COMPUTER PROGRAM DEVELOPMENT: BOPACE THEORETICAL MANUAL, ADDENDUM
15 Apr. 1975 14 p refs
(Contract NAS8-30615)
(NASA-CR-143893; D5-17266-1-Add) Avail: NTIS HC $3.25 CSCL 09B

An algorithm developed and incorporated into BOPACE for improving the convergence and accuracy of the inelastic stress-strain calculations is discussed. The implementation of separation of strains in the residual-force iterative procedure is defined. The elastic-plastic quantities used in the strain-space algorithm are defined and compared with previous quantities. J.M.S.

N75-27778# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
A MEMORY-PROCESS MODEL OF SYMBOLIC ASSIMILATION Interim Report
William C. Mann Apr. 1974 294 p refs
(Contract F44620-73-C-0074; DARPA Order 2466)
(AD-A004331; AFOSR-75-0132TR) Avail: NTIS CSCL 09/2

The report describes research on problems of using knowledge to make available information useful, which is called assimilation problems. The resulting theory contributes to psychology as a model of human short term memory, and to information science as an effective collection of new general methods. The vehicle for study is a computer program, called the Slate system, which manipulates knowledge and experience represented as labeled directed graphs. GRA

N75-27779# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DIGITAL ANALOG DEVICES FOR PRODUCING SINE AND COSINE FUNCTIONS
P. M. Chegolin, A. G. Yarusov, and G. I. Alekseev 20 Dec. 1974 18 p refs Transl. into ENGLISH from the monograph "Vychislitelnaya Tekhnika v Mashinostroenii" Minsk, Dec. 1970 p 153-160
(AD-A004434; FTD-HC-23-2886-74) Avail: NTIS CSCL 09/5

Sine and cosine converters of two types are described: one with intermediate conversion of the argument into a time interval and one with a nonlinear element. Block diagrams and time diagrams of the functioning of these devices are shown. GRA

N75-27780# New Mexico Univ., Albuquerque. Dept. of Electrical Engineering and Computer Science.
A SPECIAL COMPUTER INTERFACE DEVELOPED BY FACULTY TEAMWORK Annual Report
Victor W. Bolie, Joseph T. Cordaro, Dale C. Sparks, Harold E. Knudsen, and Lewellan T. Boatwright Aug. 1974 39 p
(Grant AF-AFOSR-2178-72; AF Proj. 9769)
(AD-A004141; EE-224(74)AFOSR-222-3; AFOSR-75-0056TR) Avail: NTIS CSCL 09/2

For research in audio/video pattern recognition, and for experimental modelling of closed-loop hybrid systems, it is found that any one of several different surplus computers can be modified in such a way that input and output data and control signals are electrically accessible. Many of the newer (and more expensive) computers include an interface unit for this purpose. Older machines, available at lower cost, can be upgraded with the addition of a carefully designed interface unit. The interface unit described herein was designed to fit the IBM 1620-Model II computer. GRA

N75-27781# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SYNTHESIS OF ALGORITHM OF SIMPLE AND SUCCESSIVE STATIC STRUCTURES
L. N. Lambin and G. Ya. Tsymbal 20 Dec. 1974 16 p refs Transl. into ENGLISH from the monograph "Vychislitelnaya Tekhnika v Mashinostroenii" (Moscow), Dec. 1970 p 31-35
(AD-A004438; FTD-HC-23-2871-74) Avail: NTIS CSCL 09/2

A method is described for cutting off excessive rows of an ordered information table, used during synthesis of algorithms. Methods are discussed for the synthesis of algorithms of simple and successive static structure. GRA

N75-27782# Ohio State Univ., Columbus. Dept of Electrical Engineering.
EXTRACTION OF SYNTACTIC FEATURES WITHIN AN ARRAY PROCESSOR M.S. Thesis
Craig S. Robinson Aug. 1974 145 p refs
(Contract AF-AFOSR-2048-71; AF Proj. 9769)
(AD-A004807; AFOSR-75-0118TR) Avail: NTIS CSCL 09/2

The purpose of this thesis was to devise algorithms for the extraction of syntactic features within a binary-valued array processor with small neighborhoods. Simulations demonstrated the success of these algorithms and emphasized the advantages of keeping image processing within the parallel part of a recognition system. GRA

N75-27783# Institute for Defense Analyses, Arlington, Va. Science and Technology Div.
AUTOMATIC DATA PROCESSING COSTS IN THE DEFENSE DEPARTMENT Final Report, Feb. - Sep. 1974
David A. Fisher Oct. 1974 69 p refs
(Contract DAHC15-73-C-0200)
(AD-A004841; P-1046; IDA/HQ-74-16529) Avail: NTIS CSCL 09/2

This paper is concerned with the cost of providing automatic data processing (ADP) services in the Department of Defense. Available cost information for ADP systems in DOD is collected, major components of those costs are identified, the costs are partitioned among computer hardware, software and other ADP, certain trends are identified, and an estimate of total annual ADP costs in DOD is made. Total annual ADP costs are estimated at $6.2-$8.3 billion or 30%-50% of all electronics expenditures in DOD. Software accounts for about 45% of all ADP costs and one-third of the ADP man-years. In the last five years the number of reported DOD computer systems has increased 28%, but the number reporting costs has declined, resulting in no increase in reported costs. Over the last five years there has been a shift from use of in-house ADP personnel toward contract services, and from rental to purchase of ADP equipment. GRA

N75-27784# Houston Univ., Tex. Dept. of Chemical Engineering.
MULTIPLE MINI-PROCESSOR COMPUTER STRUCTURES
Firmo Freire Aug. 1973 77 p refs
(Contract N00014-68-A-0151)
(AD-A004185) Avail: NTIS CSCL 09/2

This paper reports on a detailed simulation study of the feasibility of two different designs for multiple mini-processor computer structures. GRA

N75-27785# Federal Cobol Compiler Testing Service, Washington, D.C.
CDC COBOL COMPILER 4.2/LEVEL 380 Final Validation Summary Report
9 Sep. 1974 27 p
(AD-786574/4; VSR-73.C012) Avail: NTIS HC $3.75 CSCL 09B

This validation summary report (VSR) provides a consolidated summary of the results obtained from the validation of the subject compiler 4.2/level 380. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by Federal level module, a section relating the categories of discrepancies to each of the Federal levels of the language, and a detailed listing of discrepancies together with the tests which were failed. Author (GRA)

N75-27786# Mathematics and Computation Lab., McLean, Va.
READY 1 SYSTEM FOR THE UNIVAC 1108 SELECTOR PROGRAM Final Report
Dec. 1974 48 p
(PB-240931/6; GSA/OP/MCL-TM-247) Avail: NTIS HC $3.75 CSCL 15F

The selector program, part of the READY 1 system, selects from the master detail (resource) file, prepared by the READY 1 file maintenance programs, the resource point information that is relevant to a given damage assessment study. It may either build the corresponding effects computation resource information (WORC) file or select it from the master WORC file. The selector's output is then used as input to the other READY 1 programs. GRA

N75-27787# Mathematics and Computation Lab., McLean, Va.
READY 1 SYSTEM FOR THE UNIVAC 1108 POINT ANALYSIS PROGRAM
Ronald J. Buchanan, Francis J. Riley, and Barbara V. Ely Dec. 1974 55 p
(PB-240930/8; GSA/OP/MCL-TM-232) Avail: NTIS HC $4.25 CSCL 15F

The point analysis program, part of the READY 1 system, is to be used by personnel interested in producing, from the output of the READY 1 weapon effects program, an edited listing of the damage and casualty effects experienced by selected resource points. GRA

N75-27771 Joint Publications Research Service, Arlington, Va.
DESIGN FEASIBILITY OF OPTRON WITH CONTROLLED OPTICAL CHANNEL
I. F. Polyakova and N. P. Udalov *In its* Opt. and Electroopt. Data Process. (JPRS-64938) 6 Jun. 1975 p 9-13 Transl. into ENGLISH from the book "Opticheskaya i Elektroopticheskaya Obrabotka Informatsii" Moscow, Izdatelstovo Nauka, 1974 p 71-75 (For availability see N75-27769 18-59)

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N75-27788 Yale Univ., New Haven, Conn.
LINEARLY CONSTRAINED NONLINEAR PROGRAMMING: A SOLUTION METHOD THAT DOES NOT REQUIRE ANALYTIC DERIVATIVES Ph.D. Thesis
Jerrold Howard May 1974 190 p
Avail: Univ. Microfilms Order No. 75-15335

A new algorithm is presented for the minimization of a nonlinear function subject to linear inequality constraints. It is an extension of R. Mifflin's local variations-approximate Newton nonderivative method for unconstrained minimization. At each iteration of the algorithm, the coordinate system for the local variations function evaluations consists of rows of the generalized (pseudo-) inverse of the currently active constraint matrix and some rows of an orthogonal matrix. This orthogonal matrix is the Q matrix resulting from QR factorization of the active constraint matrix, and the factors Q and R are also used in the determination of the generalized inverse. A method for updating the required matrices when the set of active constraints changes, based on results of Gill, Golub, Murray, and Saunders, was employed. The algorithm does not require the explicit evaluation of either first or second partial derivatives. These quantities are approximated by differencing function values at feasible points. Computational results of an implementation of the method are presented. Dissert. Abstr.

N75-27789 North Carolina Univ., Chapel Hill.
DIFFERENTIAL STABILITY IN NONLINEAR PROGRAMMING Ph.D. Thesis
Jacques Gauvin 1974 102 p
Avail: Univ. Microfilms Order No. 75-15636

The differential stability for nonconvex programming was studied. For a program with inequality constraints, upper and lower bounds are estimated for the potential directional derivatives of the perturbation function (or the extremal-value function). These results were obtained with the help of a constraint qualification which is shown to be necessary and sufficient to have bounded Kuhn-Tucker multipliers. More restrictive conditions are given to obtain a characterization of the directional derivatives. For some special cases, the differentiability of the perturbation function was obtained. These results are extended to programs with equality and inequality constraints, and to the general parameterized nonlinear program. Dissert. Abstr.

N75-27790# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
SUMMARY OF MYCROFT: A SYSTEM FOR UNDERSTANDING SIMPLE PICTURE PROGRAMS
Ira P. Goldstein May 1974 64 p refs
(Contract N00014-70-A-0362-0005; Grant NSF GJ-1049)
(AD-A004671; AI-M-305; Logo-M-10) Avail: NTIS CSCL 09/2

A collection of powerful ideas-description, plans, linearity, insertions, global knowledge and imperative semantics-are explored which are fundamental to debugging skill. To make these concepts precise, a computer monitor called MYCROFT is described that can debug elementary programs for drawing pictures. The programs are those written for LOGO turtles. GRA

N75-27791# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
LLOGO: AN IMPLEMENTATION OF LOGO IN LISP
Ira P. Goldstein, Henry Lieberman, Harry Bochner, and Mark Miller Jun. 1974 78 p refs
(Contract N00014-70-A-0362-0005; Grant NSF GJ-1049)
(AD-A004669; AI-M-307; LOGO-M-11) Avail: NTIS CSCL 09/2

This paper describes LLOGO, an implementation of the LOGO language written in MACLISP for the ITS, TEN50, and TENEX PDP-10 systems, and MULTICS. The relative merits of LOGO and LISP as educational languages are discussed. Design decisions in the LISP implementations: CLOGO for the PDP-10 and 11LOGO for the PDP-11, both written in assembler language. LLOGO's special facilities for character-oriented display terminals, graphic display turtles, and music are also described. GRA

N75-27792# Naval Research Lab., Washington, D.C.
A FORTRAN SUBROUTINE FOR UNPACKING AND PACKING BINARY DATA
Gary W. Phillips Dec. 1974 15 p
(NRL Proj. 66H01-48)
(AD-A004180; NRL-MR-2951; NRL-Computer-Bull-41) Avail: NTIS CSCL 09/2

This is a general purpose routine to unpack data stored in core in packed binary format or to pack binary data stored word for word in an array. The data must be stored in bytes which are a multiple of three bits in length with a minimum length of 3 bits and a maximum of 48 bits. It is useful for unpacking data read in packed binary form and sorting it into an array so as to be convenient for further processing by a FORTRAN program, or for preparing data from an array for writing out in a compact form, or possibly for intermediate storage of large arrays during execution of a program in order to save core space. GRA

N75-27793# Mitre Corp., Bedford, Mass.
EXPERIMENTS WITH THE BURROUGHS B 3500 COMPUTER SYSTEM USING A SYNTHETIC WORKLOAD
K. Sreenivasan and J. E. Esposito Jan. 1975 50 p refs
(Contract F19628-73-C-0001)
(AD-A004804; MTR-2859; ESD-TR-74-312) Avail: NTIS CSCL 09/2

An application of synthetic workloads in the evaluation of the performance of batch processing, multiprogrammed, real-memory computer systems is described. Results of controlled experiments with a Burroughs B 3500 computer system in a dedicated environment using a test workload are presented. The test workload is constructed by matching the joint probability distribution of the selected real workload characteristics. They are the core size of the program, the number of files, I/O activity to disk and the CPU time. These characteristics are determined from the system accounting package, LOGGER. The accounting data, collected by LOGGER during the controlled experiments with the synthetic workload, are used to determine the utilization of the processor and the I/O channel. These utilization values compare favorably with those measured by a DYNAPROBE 7900 hardware monitor. GRA

N75-27794# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
A RELAXATION APPROACH TO SPLITTING IN AN AUTOMATIC THEOREM PROVER
Arthur J. Nevins Jan. 1974 28 p refs
(Contract N00014-70-A-0362-0003)
(AD-A004269; AI-M-302) Avail: NTIS CSCL 09/2

The splitting of a problem into subproblems often involves the same variable appearing in more than one of the subproblems. This makes these subproblems dependent upon one another since a solution to one may not qualify as a solution to another. A two stage method of splitting is described which first obtains solutions by relaxing the dependency requirement and then attempts to reconcile solutions to different subproblems. The method has been realized as part of an automatic theorem prover programmed in LISP. GRA

N75-27795# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A METHODOLOGY FOR ANALYSIS OF ALTERNATIVES IN THE ACQUISITION AND SUPPORT OF AUTOMATIC TEST

EQUIPMENT SOFTWARE M.S. Thesis
Robert W. Morton and James L. Wilson Dec. 1974 289 p refs
(AD-A004163; GSM/SM/74D-8) Avail: NTIS CSCL 14/2

This report discusses the development of a computer simulation model which can be applied to the examination of alternatives in the acquisition and support of automatic test equipment (ATE) software. The model, which is written in the GESIM version of the GPSS language, produces estimates of various costs and the timeliness of ATE software support, given an environment (influencing factors) which the model user specifies. An important feature of the model is the wide variety of influencing factors which are considered in establishing the environment or situation for any given problem to be examined. GRA

N75-27796# Naval Surface Weapons Center, Dahlgren, Va.
USER'S GUIDE FOR THE CDC 6700 COMPUTING SYSTEM
Dec. 1974 312 p refs
(AD-A003449; NSWC/DL-TR-3228) Avail: NTIS CSCL 09/2

The CDC 6700 computing system at the Naval Surface Weapons Center, Dahlgren Laboratory provides four classes of computing capability: batch processing (local and remote), graphics, time-sharing via teletype and other low-speed and medium-speed terminals, and time critical (e.g., hybrid) services. This report describes the control language and other software features implemented on the CDC 6700 computing facility at the Naval Surface Weapons Center, Dahlgren Laboratory. GRA

N75-27797# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
NBS FORTRAN TEST PROGRAMS: VOLUME 1: DOCUMENTATION FOR VERSIONS 1 AND 3 Final Report
Frances E. Holberton and Elizabeth G. Parker Oct. 1974 168 p refs
(COM-75-50138/7; NBS-SP-399-Vol-1; NBS/DF-74/006a; LC-74-12314) Avail: NTIS; SOD HC as C13.10:399/V1

The documentation, including the systems design, operating procedures, expected test results and distribution tape organization are provided for a set of FORTRAN test programs developed by the Institute for Computer Sciences and Technology, National Bureau of Standards. These test programs are written in ASA standard FORTRAN. For vol. 2 and 3, see N75-12628 and N75-12629. GRA

N75-27798# Mathematics and Computation Lab., McLean, Va.
RANDOM ACCESS PACKAGE Final Report
Nathan J. Ray Feb. 1975 17 p
(PB-240934/0; GSA/OP/MCL-TM-252) Avail: NTIS HC $3.25 CSCL 09B

The random access package is a collection of FORTRAN-callable subroutines designed to manipulate data files on the UNIVAC 1108 computer. The main advantages of this package are its small size and its ability to access items randomly on the basis of content rather than block number or drum address. GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N75-27799 Maryland Univ., College Park.
SYNTHESIS OF STEADY-STATE SIGNAL COMPONENTS BY AN ALL-DIGITAL SYSTEM Ph.D. Thesis
Robert Henry Davis 1974 109 p
Avail: Univ. Microfilms Order No. 75-14302

Various algorithms for generating steady state signals by an all digital synthesizing system are presented and analyzed. The emphasis is on evaluating the results obtained with synthesis algorithms which employ approximations or short-cuts to decrease implementation costs. Algorithms for generating both broadband and discrete or narrowband signal components using fast Fourier transform techniques were investigated, and the output spectra for the approximate techniques are derived and compared to the spectra obtained with direct approaches. An algorithm for the generation of arbitrary periodic signals in the time domain is presented and the spectrum of its output derived.
Dissert. Abstr.

N75-27800# Aeronautical Research Labs., Melbourne (Australia).
MEASUREMENT REQUIREMENTS FOR THE MANAGEMENT OF A TIME-SHARING COMPUTER UTILITY
R. C. Adams Mar. 1975 25 p refs
(ARL/S-Rept-356) Avail: NTIS HC $3.25

Special problems experienced with time-sharing utilities are analyzed in order to identify the data requirements for efficient management of an existing system. Some original measurement concepts are introduced, and ways and means of obtaining the data required are discussed. The presentation is in a machine independent form. Author

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N75-27801# Florida State Univ., Tallahassee. Dept. of Statistics.
SILENT DUELS WITH NONDISCRETE FIRING
John Patrick Lang and George Kimeldorf Nov. 1974 27 p refs
(Grant AF-AFOSR-2581-74)
(AD-A004144; FSU-Statistics-M323; AFOSR-75-0075TR; TR-41) Avail: NTIS CSCL 12/2

This paper solves a class of zero-sum, two-person games, which are closely related to the classical discrete-fire duels. GRA

N75-27802# Ohio State Univ., Columbus. Dept. of Electrical Engineering.
A METHOD OF RECOGNIZING SINGLE STRINGS OF NONTOUCHING ROTATED CHARACTERS M.S. Thesis
Thomas Edward Southard Aug. 1974 113 p refs
(Grant AF-AFOSR-2048-71; AF Proj. 9769)
(AD-A004801; AFOSR-75-0117TR) Avail: NTIS CSCL 09/2

This paper describes one method of recognizing single strings of nontouching, rotated characters of fixed-font. The method is based on a theory of two-dimensional moment invariants developed by M. K. Hu. Having input the visual image of a rotated word into the recognition system, each letter making up the string is first isolated in a systematic fashion. Then, twelve moment invariants, these components comprising a twelve-dimensional feature vector, are computed from each individual character image. Six of these features are based on the letter's silhouette and six on its boundary. GRA

N75-27803# Washington Univ., St. Louis, Mo. Control Systems Science and Engineering.
STOCHASTIC OPTIMAL CONTROL OF SINGLE-INPUT DISCRETE BILINEAR SYSTEMS Interim Report
K. N. Swamy and T. J. Tarn 1974 23 p refs
(Contract F44620-69-C-0116; AF Proj. 9749)
(AD-A004145; CSSE-749; AFOSR-75-0076TR) Avail: NTIS CSCL 12/1

Optimal control of a class of single-input, discrete, stochastic bilinear systems is discussed. The control is assumed to be unbounded and the cost functional quadratic in state. A closed-form solution has been obtained for the stochastic control problem with perfect state observation, and with additive and multiplicative noise in the state equation. It is demonstrated that the presence of noise considerably simplifies the analysis compared to the deterministic case by virtue of integration over certain sets of measure zero. When the state equation has additive noise and the observation equation is noisy, a perturbation controller is obtained to minimize the instantaneous mean-square departure from the nominal, which is chosen to be the solution to the deterministic optimal control problem. GRA

N75-27770 Joint Publications Research Service, Arlington, Va.
OPTOELECTRONIC PATTERN RECOGNITION DEVICE

A. A. Aleksandrov, R. I. Polonnikov, and Ye. I. Trofimov *In* Its Opt. and Electroopt. Data Process. (JPRS-64938) 6 Jun. 1975 p 3-8 refs Transl. into ENGLISH from the book "Opticheskaya i Elektrooptícheskaya Obrabotka Informatsii Moscow, Izdatelstvo Nauka 1974 p 66-71 (For availability see N75-27769 18-59)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N75-27804 Arizona Univ., Tucson.
LINEAR OPERATORS IN APPROXIMATION THEORY Ph.D. Thesis
Peter Richard Radatz 1974 147 p
Avail: Univ. Microfilms Order No. 75-11920

General theorems on operator approximation are developed and applied in approximating integrable, continuous, and differentiable functions, and functions of several variables. Approximation properties of several positive linear operators are investigated for the following classes of functions: integrable functions, functions of two variables, derivatives of functions, and analytic functions. Some operators are used to generate solutions to initial value problems. All topics are treated by methods of classical mathematical analysis. Dissert. Abstr.

N75-27805 Texas A&M Univ., College Station.
A SEQUENTIALLY TRANSFORMING CONJUGATE GRADIENT ALGORITHM Ph.D. Thesis
Robert Allen Rappold 1974 120 p
Avail: Univ. Microfilms Order No. 75-15059

A sequentially transforming conjugate gradient algorithm was developed. The algorithm utilizes two different coordinate systems to locate the optimal solution. One of the systems is the space of variables in which the problem is originally posed, while the other is a transformed space which is sequentially determined by information collected about the objective function via a sequence of conjugate gradient searches. The purpose of the sequentially defined coordinate system is to develop a system in which the contour surfaces of the nonlinear objective function are approximately spherical. The algorithm will be incorporated into a computer model and its relative effectiveness will be determined by comparison with the Davidon-Fletcher-Powell Algorithm. The basis for the comparison will be a series of test functions which include differing numbers of variables and varying degrees of nonlinearity. Dissert. Abstr.

N75-27806 Yale Univ., New Haven, Conn.
CHEMICAL NETWORK AND ITS APPLICATIONS TO THE REACTION MECHANISMS, REACTION PATHWAYS AND THE STABILITIES OF REACTIONS NEAR THEIR STEADY STATES Ph.D. Thesis
Lih-Syng Lee 1974 283 p
Avail: Univ. Microfilms Order No. 75-15328

Chemical network shows the stepwise relations of the species and can be used as a starting point for the stereochemistry and quantum mechanical analysis. The network is represented graphically by smooth lines, which represent the species, and wiggly lines, which represent the reactions. Each wiggly line adjoining two sets of species lines at both its ends stands for a chemical process of transformation between the species represented by the species lines. Species are classified into two categories: internal species including intermediate complexes, catalysts, free radicals, and transition states, and external species including the species in the overall reaction. Basic graphs are derived from the theory that elementary reactions are uni- or bi-molecular. Topologically distinctive graphs are represented by their skeletons which are the condensed graphs of networks composed of dotpoints and lines. Dissert. Abstr.

N75-27807# Wisconsin Univ., Madison. Mathematics Research Center.
TWO METHODS FOR SMOOTH ESTIMATION OF DISCRETE DISTRIBUTIONS
J. Van Ryzin and M. C. Wang Dec. 1974 26 p refs
(Contract DA-31-124-ARO(D)-462; Grant NSF GP-31931)
(AD-A003709; MRC-TSR-1488) Avail: NTIS CSCL 12/1

This paper presents two methods for smooth estimation of discrete distributions. Asymptotic consistency and normality is given for both estimators. Small sample performance by Monte Carlo comparison with the maximum likelihood relative frequency estimator is also examined for two smooth discrete distributions. GRA

N75-27808# Michigan State Univ., East Lansing. Dept. of Mathematics.
CHEBYSHEV APPROXIMATION BY RECIPROCALS OF POLYNOMIALS ON (0, INFINITY) Interim Report
D. Brink and G. D. Taylor 1974 14 p
(Grant AF-AFOSR-2271-72; AF Proj. 9749)
(AD-A004466; AFOSR-75-0016TR) Avail: NTIS CSCL 12/1

A uniform approximation theory is developed for the problem of approximating functions of the form $B(x)/P(x)$, P a polynomial and B(x) fixed subject to certain requirements. In particular, an alernation theorem is developed which differs from the standard alternation theorem. GRA

N75-27809# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
EFFICIENT METHODS FOR FINDING ZEROS OF FUNCTIONS WHOSE DERIVATIVES ARE EASY TO EVALUATE Interim Report
Richard Brent Dec. 1974 66 p refs Prepared in cooperation with Australian Natl. Univ.
(Contract N00014-67-A-0314-0010; Grant NSF GJ-32111; NR Proj. 044-422)
(AD-A004207) Avail: NTIS CSCL 12/1

Some multipoint iterative methods without memory for approximating simple zeros of functions of one variable are described. Explicit, nonlinear, Runge-Kutta methods for the solution of a special class of ordinary differential equations may be derived from the methods for finding zeros of functions. Numerical examples and some FORTRAN subroutines are given. GRA

N75-27810# Eidgenossische Technische Hochschule, Zurich (Switzerland).
A NUMERICAL IMPLEMENTATION OF THE GRAM-SCHMIDT ORTHOGONALIZATION, WITH SPECIAL REVIEW OF THE RITE ITERATION FOR COMPUTING EIGENVALUES Ph.D. Thesis [EINE NUMERISCHE IMPLEMENTATION DER GRAM-SCHMIDT-ORTHOGONALISATION, MIT BESONDERER BERUECKSICHTIGUNG DER RITZ-ITERATION ZUR BERECHNUNG VON EIGENWERTEN]
Andrea Mazzario 1973 65 p refs In GERMAN
(Rept-5005) Avail: NTIS HC $4.25

A computer implementation of a parallel iteration procedure for matrices is reported that calculates the product of two matrices by transferring columns of the second matrix on to the first matrix. An orthogonalization procedure provides for the extension of the computer program to strongly scalar matrices and improves calculation time for matrices with similar eigenvalues. Transl. by G.G.

N75-27811# Helsinki Univ. of Technology, Otaniemi (Finland). Inst. of Mathematics.
ON NONLINEAR DISCRETIZATION METHODS FOR ORDINARY DIFFERENTIAL EQUATIONS
Olavi Nevanlinna 1974 22 p refs
(HTKK-MAT-A48; ISBN-951-750-218-4) Avail: NTIS HC $3.25

Papers are presented which consider the numerical integration of the initial value problems of ordinary differential equations. An asymptotic theory is presented for discretization methods in which the basic concepts are formulated independent of the method considered. Topics discussed include stiff equations, the concepts of convergence and consistency, and nonlinear multistep methods. M.J.S.

N75-27812# Eidgenossische Technische Hochschule, Zurich (Switzerland).
FUNCTIONS, WHOSE LOGARITHM IS REPRESENTED AS DIFFERENCE OF SUBHARMONIC FUNCTIONS Ph.D. Thesis [FUNKTIONEN, DEREN LOGARITHMUS DARSTELLBAR IST

ALS DIFFERENZ SUBHARMONISCHER FUNKTIONEN]
Raymond Gygax 1974 156 p refs In GERMAN
(Rept-5100) Avail: NTIS HC $6.25

Differences in subharmonic functions are used to introduce algebraic structures. Exponential functions of delta subharmonic functions are really matrices of limited curvature characterized by a linear element. The various aspects of the relationship between subharmonic functions, the potential, and the Radon-Stieltjes mass are analyzed and functional theoretical properties of the subharmonic functions are developed without considering Alexandrow's topology. Transl. by G.G.

N75-27813# Technische Universitaet, Munich (West Germany).
AVOIDANCE OF TOTAL DEADLOCKS IN WEIGHTED PETRI NETS Ph.D. Thesis [VERMEIDUNG VON TOTALEN VERKLEMMUNGEN IN BEWERTETEN PETRINETZEN]
Reinhold Schroff 19 Feb. 1974 149 p refs In GERMAN
Avail: NTIS HC $5.75

Information theoretical studies on the coordination of collateral processes are reported that use weighted Petri nets to prevent locking of transitions by a sequence of transitional combinations or by a limited series of transitional combinations. It is shown that a linear dependence exists between the number of executed connections at a transition point and the produced changes in markings at a transition. A procedure is developed for calculating the number of markings for a Petri system that allows for deadlock free processing. Transl. by G.G.

N75-27814# Technische Hogeschool, Eindhoven (Netherlands).
AN OPERATIONAL ANALYSIS OF SOME QUEUEING MODELS Ph.D. Thesis
Bouke VanDerVeen 1975 179 p refs In DUTCH; ENGLISH summary
Avail: NTIS HC $7.00

Queueing models are described from the viewpoint of the operational researcher with the primary purpose of gaining insight into the phenomena. The analysis is based on the renewal theory and on very general properties of queueing systems, such as the relation L = lambda W. After an introduction into the basic phenomena, queueing models of the types M/M/S, M/G/1, G/M/1 are treated, and models with group arrivals, time-sharing, different queueing priorities are discussed. The growth of queues is demonstrated with a simulation model as well as with the theory of the random walk. The question of the relation between model and reality is treated with the help of some different approaches to a queueing system with interdependent arrivals. Author

N75-27815# Technische Hochschule, Darmstadt (West Germany).
DIFFERENCE APPROXIMATIONS OF PSEUDO-DIFFERENTIAL OPERATORS Ph.D. Thesis [DIFFERENZEN-APPROXIMATIONEN VON PSEUDO-DIFFERENTIALOPERATOREN]
Ernst Stephan 1975 116 p refs In GERMAN
Avail: NTIS HC $5.25

Difference approximations of pseudo-differential equations in Sobolew spaces are developed by defining the Fourier integral operator with the help of discrete Fourier transformations. Several pseudo-differential equations are found by infinite equation systems and these systems are studied for the validity of the Galerkin method. Transl. by G.G.

N75-27816# Technische Hochschule, Darmstadt (West Germany).
ABOUT GENERALIZED CONVOLUTION OPERATORS AND A CLASS OF INTEGRAL DIFFERENTIAL EQUATIONS Ph.D. Thesis [UEBER VERALLGEMEINERTE FALTUNGSOPERATOREN UND EINE KLASSE VON INTEGRODIFFERENTIALGLEICHUNGEN]
Frank-Olme Speck 1974 113 p refs In GERMAN
Avail: NTIS HC $5.25

The Fredholm criterium is generalized for translational invariant operators containing differential operators. Generalized convolution operators for Sobolov spaces and weighted L squared spaces are analyzed. Transl. by G.G.

N75-27817# Sandia Labs., Albuquerque, N.Mex.
A LATTICE ALGEBRA FOR FINDING SIMPLE PATHS AND CUTS IN A GRAPH
B. L. Hulme 1974 12 p refs Presented at the 6th Southeastern Conf. on Combinatorics, Graph Theory and Computing, Boca Raton, 17 Feb. 1975 Sponsored by ERDA
(SAND-75-5052; Conf-750213-1) Avail: NTIS HC $3.25

An algorithm for finding simple paths in a directed or undirected graph was given by Fratta and Montanari, and a similar algorithm for cuts was presented by Martelli. Each of these authors developed a different "regular algebra" appropriate for the problem. An algebra is presented, almost identical to Martelli's, in which both the simple path and cut algorithms are valid. It is shown that this algebra is a self-dual distributive lattice. The treatment of the simple paths and cuts within a single algebraic structure is unified. Author (NSA)

N75-27818# Illinois Univ., Urbana. Coordinated Science Lab.
MINIMAX TERMINAL STATE ESTIMATION UNDER EXPONENTIATED GENERALIZED QUADRATIC LOSS
Consuelo Sanchez DePadilla Jul. 1974 32 p refs
(Contract DAAB07-72-C-0259)
(AD-A004830; UILU-ENG-74-2220; R-654) Avail: NTIS CSCL 12/1

This work considers two related minimax terminal state estimation problems. These estimation problems can serve as mathematical models for a radar tracking problem in which one is attempting to track a blind target which is under the control of an intelligent adversary, and has been programmed to maneuver evasively. The minimax formulation reflects a game theoretic situation in which one is confronted with an evader who is faced with a trade off between a gain due to our estimation error versus a loss due to the use of energy for evasive maneuvering. In this context the model could represent a blind incoming missile which has been preprogrammed to maneuver evasively. The target is modeled as a known linear dynamic system with an unknown forcing function which is assumed to be under the control of the intelligent adversary. The estimates are minimax with respect to the class of exponentiated generalized quadratic loss functions. GRA

N75-27819# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PRINCIPLES OF THE GENERAL THEORY OF ROOT PATHS OF AUTOMATIC CONTROL SYSTEMS
G. V. Rinskii 23 Dec. 1974 426 p refs Transl. into ENGLISH of the monograph "Osnovy Obshchei Teorii Kornevykh Traektorii Sistem Avtomaticheskogo Upravleniya" USSR, 1972 p 1-326
(AD-A004329; FTD-HC-23-85-75) Avail: NTIS CSCL 12/1

The development of the root locus method is a significant step in automatic control theory. The present monograph develops a number of new ideas of the root path theory: principle of successive multiple transformations of free parameter plane, principle of construction of three-dimensional trajectories and their projections, new methods of construction of root loci, unsteady fields of root paths, root method of construction of Vyshnegradskiy's diagrams, root method of studying the absolute stability of automatic control systems, etc. The monograph adopts a new approach to the determination of root loci by treating it as the mapping of specified curves of the complex plane of the parameter onto the plane of the complex variable. It is shown that in the final analysis, all the calculations are reduced to equations of root loci. GRA

N75-27820# Technology, Inc., Dayton, Ohio.
SOME CONSIDERATIONS IN IMPLEMENTING THE ALGORITHM QZ Technical Interim Report, 21 Aug. 1973 - 20 Aug. 1974
Nai-Kuan Sao and Paul J. Nikolai Oct. 1974 20 p refs
(Contract F33615-73-C-4155; AF Proj. 7071)
(AD-A004187; ARL-74-0128) Avail: NTIS CSCL 12/1

Some considerations in implementing the QZ algorithm for generalized matrix eigenvalue problems are considered in this paper. Specifically, a new algorithm is suggested for implementing the general Householder transformation; a deflation algorithm is described for a singular triangular B with A in Hessenberg form; finally specific upper bounds are given for the negligible (2,1) elements in the final reduction of the quasi-triangular 2 x 2

blocks having real eigenvalues to upper triangular forms. These improvements are designed for better efficiency of the algorithm and improved accuracy of the final results. GRA

N75-27821# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

PLANE GEOMETRY THEOREM PROVING USING FORWARD CHAINING

Arthur J. Nevins Jan. 1974 37 p refs

(Contract N00014-70-A-0362-0003)

(AD-A004223; AI-M-303) Avail: NTIS CSCL 12/1

A computer program is described which operates on a subset of plane geometry. Its performance not only compares favorably with previous computer programs, but within its limited problem domain (e.g. no curved lines nor introduction of new points), it also invites comparison with the best human theorem provers. The program employs a combination of forward and backward chaining with the forward component playing the more important role. This, together with a deeper use of diagrammatic information, allows the program to dispense with the diagram filter in contrast with its central role in previous programs. An important aspect of human problem solving may be the ability to structure a problem space so that forward chaining techniques can be used effectively. GRA

N75-27822# Brown Univ., Providence, R.I. Div. of Applied Mathematics.

VECTOR LIAPUNOV FUNCTIONS

J. P. Lasalle Jan. 1975 19 p refs

(Contract N00014-67-A-0191-000906; Grants DA-ARO(D)-31-124-73-G130; AF-AFOSR-2078-71; NSF GP-28931; NR Proj. 041-397)

(AD-A004746) Avail: NTIS CSCL 12/1

The principal objective of this paper is to formalize and extend the basic ideas of Arrow et al for the construction of Liapunov functions, and to give for such vector Liapunov functions the more modern version of Liapunov's second method. GRA

N75-27823# Wisconsin Univ., Madison. Mathematics Research Center.

SHARPER BOUNDS FOR THE CHEBYSHEV FUNCTIONS THETA(X) AND PSI(X)

J. Barkley Rosser and Lowell Schoenfeld (State Univ. of New York, Buffalo) Oct. 1974 42 p refs

(Contract DA-31-124-ARO(D)-462)

(AD-A003706; MRC-TSR-1475) Avail: NTIS CSCL 12/1

The authors demonstrate a wider zero-free region for the Riemann zeta function than has been given before. They give improved methods for using this and a recent determination that 3,500,000 zeros lie on the critical line to develop better bounds for functions of primes. GRA

N75-27824# Florida State Univ., Tallahassee. Dept. of Statistics.

TESTS FOR THE MEAN RESIDUAL LIFE

Myles Hollander and Frank Proschan Jan. 1975 23 p refs

(Grant AF-AFOSR-2581-74; AF Proj. 9769)

(AD-A004327; FSU-TR-M326; AFOSR-75-0193TR; TR-43) Avail: NTIS CSCL 12/1

In this paper the authors develop tests for decreasing mean residual life (DMRL) and new better than used in expectation (NBUE) alternatives. The DMRL statistic is new, and critical constants and a large sample approximation are obtained to make the test readily applicable. The NBUE statistic derived is shown to be equivalent to the total time on test (TTOT) statistic; the latter is ordinarily viewed as a test statistic for increasing failure rate (IFR) alternatives. The DMRL and NBUE tests are investigated on the basis of consistency and asymptotic relative efficiency. The results lead to a reinterpretation of the TTOT statistic as a test for classes of alternatives larger than the IFR class and including the NBUE class. GRA

N75-27825# Wisconsin Univ., Madison. Mathematics Research Center.

TRANSIENCE AND RECURRENCE OF BRANCHING PROCESSES WITH STATE-DEPENDENT OFFSPRING DISTRIBUTIONS Technical Summary Report

William M. Stein Oct. 1974 27 p refs

(Contract DA-31-124-ARO(D)-462)

(AD-A003708; MRC-TSR-1478) Avail: NTIS CSCL 12/1

Let X sub n denote the Galton-Watson branching process with the following modification: Whenever X sub n = 0, X sub n + 1 is drawn from a fixed immigration distribution. Whenever X sub n = i and i is not equal to 0, each parent reproduces, independently of the others, according to the i'th of a countable set of offspring distributions. Denoting the mean of the i'th offspring distribution as mu sub i, conditions on the sequence(mu sub i) are presented which are sufficient for transience, recurrence, and positive-recurrence of X sub n. Author

N75-27826# Florida State Univ., Tallahassee. Dept. of Statistics.

PRESERVATION OF GEOMETRIC PROPERTIES UNDER AN INTEGRAL TRANSFORMATION

M. Abdel-Hameed and F. Proschan Oct. 1974 19 p refs Prepared in cooperation with North Carolina Univ., Charlotte

(Grant AF-AFOSR-2581-74)

(AD-A004326; FSU-Statistics-M314; AFOSR-75-0096TR; TR-36) Avail: NTIS CSCL 12/1

The transformation g(lambda) = integral phi (lambda, x)f(x) d mu(x), where f and phi are nonnegative Borel measurable functions of nonnegative arguments and mu denotes the Lebesgue measure on (0, infinity) or the counting measure on (0, i, ...), was investigated. It is shown that under appropriate assumptions on phi, various geometric properties of f (such as starshapedness and superadditivity) are inherited by g. GRA

N75-27827# Florida State Univ., Tallahassee. Dept. of Statistics.

ESTIMATING THE PARAMETERS OF A MULTIVARIATE EXPONENTIAL DISTRIBUTION, PART 1

Frank Proschan and Pasquale Sullo Jun. 1974 30 p refs Revised

(Grant AF-AFOSR-2058-71; AF Proj. 9769)

(AD-A004328; FSU-Statistics-M256; TR-8-R; AFOSR-75-0205TR) Avail: NTIS CSCL 12/1

The problem of parameter estimation for a (k+1)-parameter version of k-dimensional multivariate exponential distribution (MVE) of Marshall and Olkin is investigated. Although this MVE is not absolutely continuous with respect to Lebesgue measure, a density with respect to a dominating measure is specified, enabling the derivation of a likelihood function and likelihood equations. In general, the likelihood equations are not solvable explicitly but they have an unique root which is the maximum likelihood estimator (MLE). A simple estimator (INT) is derived from intuitive considerations and also arises as the first iterate in a simple procedure to solve the likelihood equations iteratively. The sequence of estimators obtained by this procedure is shown to converge to the MLE for sufficiently large samples. GRA

N75-27828# Technology, Inc., Dayton, Ohio. Instruments and Controls Div.

THEORY OF REPRESENTATIONS OF THE ROTATION AND LORENTZ GROUPS Interim Report, Oct. 1972 - Oct. 1973

Moshe Carmeli Nov. 1974 61 p refs

(Contract F33615-73-C-4155; AF Proj. 7885)

(AD-A004773; ARL-74-0132) Avail: NTIS CSCL 12/1

The theory of representations of the rotation group is described. The theory of finite dimensional representations of the Lorentz group is given also. The representations described here are based on a method originally suggested by Carmeli, where use is made of the Euler angles as well as other parametrization. The paper includes a review of group theory and a review of the basic concepts of representations theory. GRA

N75-27829# Northwestern Univ., Evanston, Ill. Dept. of Electrical Engineering.

ORDERING PROBLEMS IN TREES AND THEIR APPLICATIONS TO TREE-STRUCTURED OPERATIONS OR FILES

A. N. Patrinos and S. L. Hakimi 1974 6 p refs Presented at Conf. on Inform. Sci. and Systems, Princeton, N. J., Mar. 1974 Submitted for publication

(Grant AF-AFOSR-2103-71; AF Proj. 9749)

(AD-A004481; AFOSR-75-0020TR) Avail: NTIS CSCL 12/1

Ordering problems in oriented and free trees are considered.

An optimal ordering of vertices can minimize the working space needed to evaluate a tree-structured set of operations. Other ordering problems, related to access time minimization of tree-structured files on linear access stores, are briefly discussed. GRA

N75-27830# City Univ. of New York.
EXPANSIONS IN LEGENDRE FUNCTIONS OF INTEGRAL DEGREE OF LEGENDRE EIGENFUNCTIONS OF NON-INTEGRAL DEGREE ARISING IN THE STUDY OF STABILITY OF INCOMPLETE SPHERICAL STRUCTURES Scientific Interim Report
Harpy E. Rauch Dec. 1974 15 p refs
(Grant AF-AFOSR-2063-71; AF Proj. 9749)
(AD-A004467; AFOSR-75-0018TR) Avail: NTIS CSCL 12/1

An explicit expansion of a simple kind of Legendre polynomial is illustrated. The coefficients of this expansion are simple linear combinations of Legendre polynomials evaluated at x sub 0 and the terms decrease in modulus like 1 to the minus 5th power as 1 approaches infinity. Thus, in view of the recursion relation for Legendre polynomials, the expansion becomes an effective device for machine computation both of the degrees n, or the eigenvalues n(n+1), and the eigenfunctions y. A similar expansion in terms of associated Legendre functions of integral degree holds for solutions of the associated Legendre equation of order 1. Analogous expansion for the Legendre eigenfunctions with boundary conditions y(x sub 0) = y(x sub 1) = 0, 1 < x sub 0< x sub 1<1 are given. The introduction of the associated Legendre eigenfunctions is motivated by stability studies of incomplete spherical structures using the method of formal eigenfunction expansions. The Legendre eigenfunctions are useful in certain electromagnetic field and heat conduction problems in regions with spherical conical boundaries.
Author (GRA)

N75-27831# Wisconsin Univ., Madison. Mathematics Research Center.
A CONVERSE TO SOME INEQUALITIES AND APPROXIMATIONS IN THE THEORY OF STIELTJES AND STOCHASTIC INTEGRALS, AND FOR n-th DERIVATIVES Technical Summary Report
L C. Young Dec. 1974 17 p refs
(Contract DA-31-124-ARO(D)-462; Grant NSF GP-27211)
(AD-A003722; MRC-TSR-1499) Avail: NTIS CSCL 12/1

The object of this report is to establish by counter-examples the best possible character of theorems recently obtained about stochastic integrals and Stieltjes integrals, and about n-th derivatives and finite differences. The hypotheses involve a pair of estimate functions subject to the convergence of a corresponding integral or Y-series, and it is shown that the divergence of this integral or series render in each case the conclusion false.
GRA

N75-27832# Florida State Univ., Tallahassee. Dept. of Statistics.
ESTIMATING THE PARAMETERS OF A MULTIVARIATE EXPONENTIAL DISTRIBUTION, PART 2 Interim Report
Frank Proschan and Pasquale Sullo Oct. 1974 25 p refs
(Grant AF-AFOSR-2581-74; AF Proj. 9769)
(AD-A004319; FSU-Statistics-M319; TR-37;
AFOSR-75-0091TR) Avail: NTIS CSCL 12/1

The problem of parameter estimation for the ((2 sup k)-1)-parameter, k-dimensional multivariate exponential distribution (MVE) of Marshall and Olkin is investigated. In a previous part of this report (Part I), a (k+1)-parameter version of the MVE was studied. The simpler results and concepts expounded in Part I are here extended and generalized to the ((2 sup k)-1)-parameter case. Although the MVE contains singularities, a density with respect to a (non-Lebesgue) dominating measure is specified. The likelihood equations which result, while not explicitly solvable, possess an unique root which is the maximum likelihood estimator (MLE). An alternate estimator (INT) is derived from an intuitive principle also satisfied by the MLE. INT also arises as the first iterate in a simple iterative procedure which converges to the MLE. Estimation is illustrated for the trivariate case. GRA

N75-27833# Rice Univ., Houston, Tex. Dept. of Mechanical and Aerospace Engineering and Materials Science.
NEW TRANSFORMATION TECHNIQUE FOR OPTIMAL CONTROL PROBLEMS WITH BOUNDED STATE. PART 2: EXAMPLES
A. Miele and J. R. Cloutier 1974 70 p refs
(Grant AF-AFOSR-2185-72; AF Proj. 9749)
(AD-A004334; AAR-123; AFOSR-75-0143TR) Avail: NTIS CSCL 12/1

In Part I (AD/A-004 333), Miele and Cloutier developed a new transformation technique for optimal control problems with bounded state. This transformation technique was employed in conjunction with the sequential gradient-restoration algorithm. In this report, five numerical examples are presented, some pertaining to the fixed-final-time case and some pertaining to the free-final-time case. The numerical results show the rapid convergence characteristics of the algorithm discussed in Part I.
GRA

N75-27834# Ballistic Research Labs., Aberdeen Proving Ground, Md.
DESCRIPTION AND COMPARISON OF THE K METHOD FOR PERFORMING NUMERICAL INTEGRATION OF STIFF ORDINARY DIFFERENTIAL EQUATIONS
M. D. Kregel and E. L. Lortie Jul. 1974 67 p refs
(AD-A003855; BRL-1733) Avail: NTIS CSCL 12/1

A numerical integration method, termed the K method, has been developed within the Concepts Analysis Laboratory for the integration of about fifty stiff ordinary differential equations. This method is described and, by the use of several benchmark sets of ordinary differential equations, comparisons are made with other methods that have been described in the open literature. Instructions are given on the use of the K method, and a complete listing of the method is included. GRA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N75-27835# Eidgenossische Technische Hochschule, Zurich (Switzerland).
FLUCTUATIONS IN SOME SOLUBLE MODELS IN QUANTUM STATISTICAL MECHANICS Ph.D. Thesis
Walter F. Wreszinski 1973 38 p refs
(Rept-5064; ISBN-3-260-03770-5) Avail: NTIS HC $3.75

The normality of fluctuations in the Dicke maser model was investigated along with fluctuations in solvable models in quantum statistical mechanics which exhibit a phase transition. Fluctuations were studied from the point of view of equilibrium statistical mechanics, and a linear response theory for a class of operators is briefly considered in the BCS model. It was found that the infinite volume version of the Ornstein-Zernicke equation of state (relating the infinite volume limit of the fluctuation of the number operator to the integral of a truncated correlation function) is not in general valid for the free Fermi and Bose gases. Author

N75-27836# Oak Ridge National Lab., Tenn.
TECHNIQUES FOR EFFICIENT MONTE CARLO SIMULATION. VOLUME 1: SELECTING PROBABILITY DISTRIBUTIONS
E. J. McGrath, S. L. Basin, R. W. Burton, D. C. Irving, S. C. Jaquette, W. R. Ketler, and C. A. Smith Apr. 1975 163 p refs
(Contract W-7405-eng-26)
(ORNL-RSIC-38-Vol-1) Avail: NTIS HC $6.25

Present techniques and methods for developing efficient Monte Carlo simulation for reducing computational effort are presented: selecting probability distributions; random number generation for selected probability distributions; and variance reduction. A straightforward approach and associated techniques are provided for selecting the most appropriate probability distributions for use in Monte Carlo simulations. The underlying concepts and principles for selecting probability distributions are discussed. Mathematical models representing stochastic processes and step-by-step procedures for identification and selection of

the appropriate probability distributions are presented based upon the degree of knowledge and available data for the random variable under study. Author (NSA)

N75-27837# Oak Ridge National Lab., Tenn.
TECHNIQUES FOR EFFICIENT MONTE CARLO SIMULATION. VOLUME 3: VARIANCE REDUCTION
E. J. McGrath and D. C. Irving Apr. 1975 161 p refs
(Contract W-7405-eng-26)
(ORNL-RSIC-38-Vol-3) Avail: NTIS HC $6.25

Many Monte Carlo simulation problems lend themselves to the application of variance reduction techniques which can result in improvements in simulation efficiency. The document describes the basic concepts of variance reduction and a methodology for application of variance reduction techniques. Appendices include the basic analytical expressions for application of variance reduction schemes as well as an abstracted bibliography. The techniques considered include importance sampling, Russian roulette and splitting, systematic sampling, stratified sampling, expected values, statistical estimation, correlated sampling, history reanalysis, control variates, antithetic variates, regression, sequential sampling, adjoint formulation, transformations, orthonormal, and conditional Monte Carlo. Emphasis was placed on presentation of the material for application by the general user by presenting a step by step procedure for selection and application of the appropriate technique(s) for a given problem. Author (NSA)

N75-27838# TRW Systems Group, Redondo Beach, Calif.
FAILURE ANALYSIS BY STATISTICAL TECHNIQUES (FAST). VOLUME 1: USER'S MANUAL Final Report, 1 Apr. 1973 - 30 Apr. 1974
William H. Rowan, Jack J. Farrell, Aileen S. Nii, Norman Lipner, and John D. Oliver 31 Oct. 1974 129 p refs
(Contract DNA001-73-C-0222)
(AD-A004295; TRW-24006-001-RU-00-Vol-1; DNA-3336f-1) Avail: NTIS CSCL 15/3

The document is a user's manual for the FAST (Failure Analysis by Statistical Techniques) computer code. FAST is a technique for performing a statistical evaluation of the survivability of military or civilian systems subjected to a hostile environment such as would be caused by a nuclear burst or earthquake. The document contains a description of the analysis formulation, the inputs needed to perform system assessment studies, and the code and its operation, and a demonstration of the code operation through documentation of a sample problem which has been designed to address the key aspects of the methodology and its practical application. The two volumes of the document are those of Volume I, User's Manual, and Volume II, User's Manual (Appendices). The code itself was developed by TRW Systems Group over the past decade, mainly for MINUTEMAN under sponsorship of the Air Force Space and Missile Systems Organization (SAMSO). GRA

N75-27839# Naval Postgraduate School, Monterey, Calif.
A COMPARISON OF RATE 1/N CONVOLUTIONAL CODES OVER A SIMULATED NOISY CHANNEL USING THE VITERBI DECODING ALGORITHM M.S. Thesis
James Howard Haney Dec. 1974 99 p refs
(AD-A004615) Avail: NTIS CSCL 09/4

The application of error detection and correction codes has advanced markedly with the advent of digital technology. However, the strides made towards employing the techniques, encoding and decoding, properly have been rather limited by the Naval forces in the United States. This paper develops a computer program, which if used properly, would aid in deciding what error correcting scheme is best suited for a specific channel. The results obtained from testing a rate 1/n convolutional code, over a simulated channel, using a Viterbi decoder shows that this is an effective analysis procedure. Though the test runs were lengthy, much of the time required was for noise simulation. This would not be a factor if actual channel noise recordings had been available. GRA

N75-27840# Oklahoma State Univ., Stillwater.
STATISTICAL CONCEPTS FOR DESIGN ENGINEERS Final Report
J. R. Murphy and L. D. Broemeling Sep. 1974 152 p refs
(Grant EPA-R-802269)
(PB-239721/4; EPA-650/2-74-080) Avail: NTIS HC $6.25 CSCL 12A

The report describes basic statistical concepts for engineers engaged in test design. Although written in handbook form for use within the Environmental Protection Agency, it is not intended to replace existing statistics textbooks. Its objectives are: to enable design engineers to converse with consulting statisticians, to introduce basic ideas for further individual study, and to enable the reader to make some immediate applications to his own work. GRA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N75-27841# Houston Univ., Tex. Dept. of Computer Science.
SYSTEM STATE MODEL 2: AN IMPROVED DISCRETE MODELING CONSTRUCT
John J. Lenahan Aug. 1974 72 p refs
(Contract N00014-68-A-0151)
(AD-A004873) Avail: NTIS CSCL 12/2

The system-state model (SSM) is both an abstract and a computational modelling construct for representing, in the discrete time domain, at arbitrary and varying levels of specificity, process activity inherent in many classes of systems. Representable activity may be simultaneous, asynchronous and hierarchical. GRA

N75-27842# California Univ., Riverside. Dept. of Mathematics.
ADMISSIBLE MEANS AND LIKELIHOOD RATIOS OF TIME SERIES Interim report, 1 Aug. 1973 - 1 Aug. 1974
M. M. Rao Nov. 1974 64 p refs
(Contract F33615-74-C-4009; AF Proj. 7071)
(AD-A004781; ARL-74-0137) Avail: NTIS CSCL 09/4

If a time series arises from an additive model, representing the output of a communication channel with a sure signal and a noise, consider the class of all admissible signals for the same noise. Here admissibility means that there is a nontrivial statistical test theory to distinguish between no signal and a nonzero signal. In this report geometrical properties of the set of admissible signals are studied because they are useful in the channel design. GRA

N75-27843# Naval Postgraduate School, Monterey, Calif.
CALCULATOR-AIDED MICROWAVE NETWORK ANALYSIS M.S. Thesis
John Calhoun Carlton, Jr. Dec. 1974 116 p refs
(AD-A004230) Avail: NTIS CSCL 09/5

The HP-8410S Microwave Network Analyzer System and the Wang 600 Programmable Calculating and Plotting System are discussed. An interface between the two is described and the feasibility of microwave network analysis under program control is demonstrated. Four calculator programs which implement S-parameter sampling and data reduction are described and documented. GRA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N75-27844 Pennsylvania Univ., Philadelphia.
GENERALIZED FREE STATES OF THE GAUGE INVARIANT ALGEBRA OF THE CANONICAL ANTICOMMUTATION RELATIONS Ph.D. Thesis
George Panayotis Stamatopoulos 1974 131 p
Avail: Univ. Microfilms Order No. 75-14628

The generalized free states on this algebra are the states yielded by most physical models of free or interacting fermions both in the finite and the infinite (thermodynamic limit) systems'

case (free Fermi gas, X-Y model, BCS model). Two results are proven. It is shown that if the operator A(I-A) is of trace class, then the corresponding to the operator A gauge invariant generalized free state is not a factor state of the GICAR algebra. The second result is that two pure generalized free states of the GICAR algebra, characterized by the projections E and F of the one-particle Hilbert space, are unitarily equivalent if and only if the operators E(I-F)E and (I-E)F(I-E) are of trace class and have the same trace. As an immediate consequence of this, there are uncountably-infinite many unitarily inequivalent representations of the GICAR algebra, corresponding to the infinite free Fermi gas at various densities and they are all unitarily inequivalent to the Fock representation. Dissert. Abstr.

N75-27845# Technische Hochschule, Darmstadt (West Germany).
ON THE THEORY OF DISCRETION FOR VARIATIONAL PROBLEMS Ph.D. Thesis [ZUR THEORIE DER DISKRETISIERUNG VON VARIATIONSPROBLEMEN]
Knut Merten 7 Feb. 1975 72 p refs In GERMAN
Avail: NTIS HC $4.25

The approximative solution for quasilinear boundary value problems substitutes the variable integer by a discrete analog to obtain the nonlinear equation system with corresponding symmetrical function matrix. Specific conditions for a stable positive definition of the functional matrix are presented.
Transl. by G.G.

N75-27846# Eidgenossische Technische Hochschule, Zurich (Switzerland).
COTENSOR PRODUCTS OF COMODULES AND COTOR DERIVED FUNCTORS Ph.D. Thesis [SUR LE PRODUIT COTENSORIEL DE COMODULES ET SES FONCTEURS DERIVES COTOR]
Richard Zufferey 1973 60 p refs In FRENCH; ENGLISH summary
(Rept-5065) Avail: NTIS HC $4.25

The usual concepts of algebra lambda (over a commutative ring K), lambda-module, and tensor product of two lambda-modules can be dualized in reversing the direction of the respective structure maps. One thus obtains the concepts of coalgebra lambda (over K), lambda-comodule, and cotensor product of two lambda-comodules. The latter is a covariant functor to K-modules, left exact in each variable if short exact sequences of lambda-comodules are understood to be split-exact sequences of K-modules. Injective comodules with respect to these exact sequences, and the corresponding relative homology theory are considered. A spectral sequence argument shows that the injective resolution of each of the two variables in the cotensor product yields the same derived functors. Author

N75-27847# Technische Hochschule, Darmstadt (West Germany).
THE DUAL SPACE IN WEIGHTED SPACES OF CONSTANT FUNCTIONS Ph.D. Thesis [DER DUALRAUM GEWICHTETER RAEUME STETIGER FUNKTIONEN]
Gert Kleinstuck 8 Oct. 1974 111 p refs In GERMAN
Avail: NTIS HC $5.25

The problem of integral representation of steady linear functionals on topological vector spaces of steady functions is considered. Analyzed are sub-rooms of the type CV(X) by an expansion of the generalized Stone-Weierstrass theorem, and by other methods that use Grothendieck's approximative properties to describe the completeness of injective tensor product weighted rooms.
Transl. by G.G.

N75-27848# Technische Hogeschool, Delft (Netherlands).
REGULARITIES OF RINGS Ph.D. Thesis
Cornelis Roos 1975 91 p refs
Avail: NTIS HC $4.75

A general theory of regularities for rings was developed, and it is shown that any regularity determines a subradical and a radical for the class of all (associative) rings. A method was developed to generate regularities with the help of a finite set of integral polynomials; the arising regularities are called polynomial regularities, or monomial regularities if each of the polynomials concerned is a monomial. The notions of overnilpotence' and underidempotence' for a regularity are defined, and necessary and sufficient conditions are derived for a polynomial regularity to be overnilpotent or underidempotent. It is shown that any unique polynomial regularity can be thought of as the intersection of so-called elementary unique polynomial regularities and a unique monomial regularity, and analogous results for null polynomial regularities are presented. Monomial regularities which are either unique or null are discussed. M.J.S.

N75-27478 GATE Operational Control Centre, Dakar (Senegal).
VERTICAL MOTION AND VORTICITY IN THE A/B-SCALE AREA, PHASE 2
Wayne H. Schubert (Colorado State Univ., Fort Collins) and Richard J. Reed (Washington Univ., Seattle) *In* WMO Prelim. Sci. Results of the GARP Atlantic Trop. Expt., Vol. 1 Jan. 1975 p 137-144 ref (For availability see N75-27466 18-42)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N75-27849 Yale Univ., New Haven, Conn.
AN INTERACTING DUAL RESONANCE MODEL IN TERMS OF DIRECT INTER-STRING ACTION Ph.D. Thesis
Michael Kalb 1974 151 p
Avail: Univ. Microfilms Order No. 75-15315

The interactions are discussed of the bosonic sector of dual resonance models using the strong formalism and the possible couplings generated by an action-at-a-distance theory. Antisymmetric tensor coupling which exhibits similarity to electrodynamics was investigated. The direct interparticle action was obtained for the general case, including higher derivative couplings. The physically reasonable constraint of parameterization independence is exhibited, and the restrictions on the action were obtained. From this point, discussion is limited to those interactions which give second order Euler-Lagrange equations of motion for the particles. Parameterization independence leads to homogeneity requirements on the interactions. Using the method of Feynman and Wheeler, the Dirac-Lorentz force law was obtained. The abstraction of adjunct fields from this parameterization independent theory leads to Maxwell's equations, and gauge invariance with the automatic satisfaction of the Lorentz condition. Dissert. Abstr.

N75-27850 Rochester Univ., N.Y.
RADIATION AND PROPAGATION OF LIGHT IN CRYSTALS Ph.D. Thesis
Jakob Johan Stamnes 1975 262 p
Avail: Univ. Microfilms Order No. 75-15231

The radiation and propagation of nonplanar electromagnetic waves in linear, homogeneous, nondispersive, conducting and anisotropic media is described. The exact integral expressions for the fields radiated by known sources and by planar surfaces with known boundary values in uniaxial and biaxial media are provided. The radiation by a localized source in a uniaxial medium is treated in a Cartesian coordinate system. It is shown that the electromagnetic field may be derived from two scalar potentials; the electromagnetic field radiated by a planar surface oriented arbitrarily with respect to the principal axes is determined; and, asymptotic approximations to the exact solutions are derived. The theory is also applied to solve the problem of reflection and refraction of an arbitrary wave at a planar interface separating two uniaxial media. Dissert. Abstr.

N75-27851# Lockheed Missiles and Space Co., Palo Alto, Calif.
POLARIZATION PARAMETERS OF A MONOCHROMATIC WAVE IN A COMPLEX REPRESENTATION, CHAPTER 1
K. G. Gusev, A. D. Filatov, and A. P. Sopolev 1974 31 p Transl. into ENGLISH from the book "Polarizatsionnaia Moduliatsii" Moscow, Sovetskoe Radio, 1974 p 8-48
Avail: NTIS HC $3.75; National Translations Center, John Crerar Library, Chicago, Ill. 60616

Polarization of electromagnetic waves is characterized by two fundamental parameters: the angle of orientation (theta) of one of the semi-axes of the polarization ellipse, and the ratio between the minor and major semi-axes of the polarization ellipse (the

coefficient of ellipticity K). The direction of field vector rotation is given by the sign of the coefficient of ellipticity. The angles phi and theta are the main parameters which vary in conformity with the message being transmitted during information transmission by modulation of the wave polarization parameters. The phase phi of an elliptically polarized wave can be a parameter containing useful information, or can be used for a unique determination of the quantities phi and theta. An investigation was conducted to refine the limits of the unique measurement of the parameters phi, theta, as well as the determination of the phase of the elliptically polarized wave. Questions of representing an elliptically polarized field in a double complex plane are discussed. Author

N75-27852# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France).
COMPUTATION OF PERTURBED FIELDS AND PRESSURE BALANCE CONDITIONS FOR THE NON-LINEAR KINK COUPLING PROBLEM
R. Y. Dagazian Aug. 1974 9 p ref
(EUR-CEA-FC-747) Avail: ERDA Depository Libraries HC $4.00

A detailed outline is given of the computer work which leads to the calculation of the perturbed fields and of pressure balance conditions relevant to a stability study of cylindrical magnetic configurations. This calculation is carried out to the third order in the amplitude of the two linearly marginal modes whose beating is analyzed: the m = 1, n = 1 internal mode and the m = 2, n = 1 external kink. Besides its numerical aspect, this work has involved the extensive use of FORMAC, a symbolic manipulation compiler. Author (NSA)

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N75-27853 British Library Lending Div., Boston Spa (England).
A NEW THEORY OF ROOM REVERBERATION TIMES
J. Pujolle 9 Dec. 1974 13 p refs Transl. into ENGLISH from Rev. Acoust. (France), no. 27, 1973 p 263-267
(BLL-TRANS-3175-(9022.81)) Avail: British Library Lending Div., Boston Spa, Engl.: 2 BLL photocopy coupons

The imperfections of various hypotheses used to obtain room reverberation times are discussed. The occurrences at any listening point when image sources of a given sound power are added to the actual source are examined. The numbers and positions of these image sources are defined. The sound intensity at the listening point is calculated using approximations which are validated. A reverberation time formula is developed which gives results between those provided by two previous formulae. The result is modified by the shape of the room and the mean free path which is calculated. Two consequences of this theory are given for the measurements in a live room and to obtain a room response to transients. Author

N75-27854*# Techtran Corp., Glen Burnie, Md.
HYDRODYNAMIC SOUND FORMATION AND SOUND PROPAGATION IN A CONFINED MEDIUM
B. P. Konstantinov Washington NASA Jun. 1975 115 p refs Transl. into ENGLISH of the book "Gidrodinamicheskoye Zvukoobrazovaniye i Rasprostraneniye Zvuka v Ogranichennoy Srede" Leningrad, Nauka Press, 1974 p 1-144
(Contract NASw-2485)
(NASA-TT-F-15760) Avail: NTIS HC $5.25 CSCL 20A

Fundamental questions in the field of hydrodynamic sound formation are treated. A theory is presented of the self-oscillations of the reed of a musical wind instrument; the theory forms a basis for all applied research on wind instruments and study of the sound absorption caused by the flow of heat away from boundaries. Other topics discussed include hydrodynamic sound generation by valves, excitation of acoustic vibrations in an airflow, certain methods of sound formation, and influence of viscosity and thermal conductivity on sound propagation in a confined medium. Author

N75-27855*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.
RADIATED NOISE FROM AN EXTERNALLY BLOWN FLAP
N. N. Reddy and J. C. Yu (George Washington Univ.) Washington Jul. 1975 36 p refs
(NASA-TN-D-7908; L-9895) Avail: NTIS HC $3.75 CSCL 20A

The far field noise from subsonic jet impingement on a wing-flap with a 45 deg bend was experimentally investigated. The test parameters are jet Mach number and flap length. For long flaps, the primary source mechanisms are found to be turbulent mixing and flow impingement. For short flaps, the interaction of turbulent flow with the flap trailing edge appears to strongly influence the radiated noise. Author

N75-27856# Joint Publications Research Service, Arlington, Va.
INVESTIGATING THE NOISE STABILITY OF SOME SUPERDIRECTIONAL SOUND RECEIVERS
D. V. Bazhenov and Yu. I. Belousov 10 Jul. 1975 12 p refs Transl. into ENGLISH from Tr. Akust. Inst. (Moscow), no. 9, 1969 p 127-140
(JPRS-65203) Avail: NTIS HC $3.25

A description is given of the operating conditions of superdirectional acoustic receivers located in a near noise field. Author

N75-27857# Joint Publications Research Service, Arlington, Va.
ACOUSTICS AND SUPERSONICS
10 Jul. 1975 69 p refs Transl. into ENGLISH from Akust. i Ultrazvukovaya Tekhn. (Kiev), 1974 p 66-115
(JPRS-65198) Avail: NTIS HC $4.25

Articles are presented on acoustics and supersonics. Topics discussed include echo signals from the bottom of water basin with nondirectional fathometer vibrators, ultrasonic delay lines, space-time processing receiver, receiver optimum for two-component signal, orthogonal correlometry of random processes, spectral correlation characteristics of process products, digital computers, spectral and correlation properties of echo signals from moving linear reflector, and optimum adaptive detection. M.J.S.

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N75-27858 Wisconsin Univ., Madison.
A STUDY OF ANTIPROTON PROTON CHARGE EXCHANGE AND ANTINEUTRON PROTON (CHARGED PRONG) ANNIHILATION IN THE LOW MOMENTUM RANGE Ph.D. Thesis
Victor Richard Scherer 1974 174 p
Avail: Univ. Microfilms Order No. 75-10000

Results of the study of the antiproton-proton-antineutron-neutron charge exchange reaction in the low antiprotons momentum range from 800 Mev/c down to about 250 Mev/c (laboratory kinetic energy region 35-290 Mev) are presented. The data arise from the analysis of some 220,000 pictures taken in a series of exposures of the 30-inch Brookhaven liquid hydrogen bubble chamber to a low-momentum separated antiproton beam at the AGS. The measurement was based on a final filtered sample of 2,016 events in which the annihilation star of the antineutron is observed. Angular distributions for the charge-exchange process were obtained, and results are given for the total and differential cross-sections. The experimental results are analyzed and compared with some existing theoretical model predictions. Also examined are several aspects of the antineutron-proton annihilation reaction. Results of absorption-fitting technique measurements of total antineutron-proton cross-sections are presented. Dissert. Abstr.

N75-27859 Boston Coll., Chestnut Hill, Mass.
A PHENOMENOLOGICAL MODEL OF HIGH ENERGY

HADRON-HADRON SCATTERING Ph.D. Thesis
Joseph Saint Amand 1975 171 p
Avail: Univ. Microfilms Order No. 75-15745

The strong interaction of hadrons in the momentum range 10 Gev/c to 400 Gev/c is investigated from the perspective of a phenomenological model of hadrons defined essentially by six axioms. Hadrons are regarded as extended objects with well defined root-mean-square radii for the strong interaction. Employing a special case of the uncertainty principle, the rms value of the transverse momentum of the final state particles in the reaction 'X+p yields anything' is calculated as a function of the maximum multiplicity observed at a given energy. Here X can be a proton, pion, or kaon. In the determination of tranverse momentum as an implicit function of energy, the interaction probabilities of the colliding hadrons are folded geometrically to yield a probability density overlap function, W (b), which function is dependent on the impact parameter 'b' and the rms interaction radii of the interacting hadrons. Predictions are made as to the effect of varying radii. Dissert. Abstr.

N75-27860 Yale Univ., New Haven, Conn.
PRODUCTION OF POLARIZED ELECTRONS Ph.D. Thesis
Joseph Stanley Ladish 1974 288 p
Avail: Univ. Microfilms Order No. 75-15324

Sources of polarized electrons which were developed for use in experiments are described. A pulsed source of polarized electrons based on the photoionization of an intense polarized lithium-6 atomic beam by UV light produced by a pulsed high-pressure xenon flash lamp is studied. The polarization of the initially bound valence electron is retained by the ejected photoelectron. Polarization of the atomic beam is accomplished by passing an unpolarized atomic beam through a permanent sixpole magnet. Electrons produced in the photoionization process are extracted out of the photoionization region, accelerated and electron polarization is measured by Mott scattering from a gold foil. A dc source of polarized electrons is also described which is based on the photoionization of an unpolarized cesium atomic beam by a circularly polarized beam of UV light in the spectral range near the cesium photoionization threshold. Dissert. Abstr.

N75-27861 Yale Univ., New Haven, Conn.
INTERACTIONS OF HIGHLY EXCITED HYDROGEN ATOMS. 1: IONIZATION IN INTENSE ELECTROMAGNETIC FIELDS. 2: ELECTRON LOSS IN LOW ENERGY MERGED-BEAMS COLLISIONS WITH PROTONS Ph.D. Thesis
Peter MacWilliams Koch 1974 394 p
Avail: Univ. Microfilms Order No. 75-15317

Two different types of interactions of highly excited hydrogen atoms having the principal quantum number n were experimentally studied. The H (high n) were made by electron transfer reactions of protons near 11 keV energy in a gas scattering cell. A technique was developed to define experimental signals due to only a band of n values several units wide. These 'n-band' modulation techniques relied on a theoretically and experimentally justified extrapolation of static electric field ionization data. The role of substrates in the n-band definition process is treated. The absolute intensities of the H (high n) flux produced in various n-bands by H+ and Xe collisions near 11 keV were measured in calibration experiments. It is shown that higher frequency waves are more effective for ionization than are low frequency waves. Results of a classical Monte Carlo calculation are given. Experimental data and Born approximation calculations for the H+ and H ionization cross-section are also given.
Dissert. Abstr.

N75-27862 California Univ., Davis.
MEASUREMENT OF THE DIFFERENTIAL CROSS SECTION FOR COMPTON SCATTERING BY BOUND ELECTRONS Ph.D. Thesis
Guy Calvin Spitale 1974 45 p
Avail: Univ. Microfilms Order No. 75-15460

Singly differential cross sections for incoherent scattering by K-shell electrons were measured for incident photons having energies of 662 keV, 320 keV and 145 keV. The spectral distributions of scattered photons were examined. Target materials were iron, tin, holmium, and gold at 320 keV; tin and gold at 662 keV; and iron and tin at 145 keV. It was not possible to draw specific conclusions from the 145-keV data. A typical spectrum at 320 keV consisted of a scattered peak which was much narrower than would be expected from the bound state electron motion. Rather than monotonically increasing with atomic number as expected, the peak width reached a maximum near Z = 50 and then decreased with increasing atomic number. The peak also reached a maximum width for a scattering angle between 45 and 60 deg. The same angular behavior was observed at 662 keV and the peaks in the gold spectra were narrower than corresponding peaks in the tin spectra. Dissert. Abstr.

N75-27863 Yale Univ., New Haven, Conn.
STATISTICAL EFFECTS IN THE INTERACTIONS OF COMPLEX NUCLEI Ph.D. Thesis
Dan Shapira 1974 234 p
Avail: Univ. Microfilms Order No. 75-15373

Heavy ion scattering and reaction excitation functions in many light nuclear systems are characterized by marked energy dependence. This energy dependence spans a wide range of characteristic widths: hard broad structure attributable to potential scattering or much narrower structure suggestive of statistical fluctuation phenomena. The situation in the (C-12)+ (C-12) and (O-16)+ (C-12) systems were investigated experimentally and theoretically. Existing elastic scattering and newly measured reaction data were subjected to a consistent statistical examination. Synthetic excitation techniques were evolved to determine empirical corrections to the parameters extracted from such analyses to reflect the presence of nonstatistical, potential scattering phenomena. Using these corrections, entirely consistent values of average widths were obtained for all channels studied.
Dissert. Abstr.

N75-27864 Pennsylvania Univ., Philadelphia.
ELECTROMAGNETIC AND NEUTRINO FIELDS IN GENERAL RELATIVITY: A CONSTRUCTIVE PROCEDURE Ph.D. Thesis
Lawrence Steven Kegeles 1974 112 p
Avail: Univ. Microfilms Order No. 75-14580

A new procedure for constructing electromagnetic and neutrino fields in curved space-times is formulated. The basic method consists of a covariant generalization of the Debye - or two-component Hertz - potential formalism of flat space. The formulation replaces the strongly coupled first-order Maxwell or Dirac system by a fully decoupled second-order differential equation. The problem of computing these fields is reduced to solving a single complex linear second-order scalar wave equation; the fully covariant physical spinor or tensor field is derived from the scalar solution of this wave equation by prescribed and straightforward differentiation. The Hertz formalism was extended to all curved space-times; the Debye two-component (or one-complex-component) formalism was extended to those space-times conformally related to vacuum space-times with algebraically specialized Weyl tensor. Dissert. Abstr.

N75-27865 Missouri Univ., Rolla.
THE EFFECT OF CONTACT ANGLE, SURFACE ROUGHNESS, AND ADSORPTION ON HETEROGENEOUS NUCLEATION OF CONDENSING WATER Ph.D. Thesis
Prafulla Chandra Mahata 1974 79 p
Avail: Univ. Microfilms Order No. 75-15840

Condensation of water vapor on various surfaces was studied experimentally. It was found that supersaturations as high as 25% were required to initiate condensation on hydrophobic surfaces. The supersaturation data agreed qualitatively with the Volmer theory of heteorogeneous nucleation. The influence of adsorption of water vapor was found to be small. Surface roughness caused a little reduction in the critical supersaturation. Dissert. Abstr.

N75-27866# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
EXPERIMENTAL DETERMINATION OF THE VELOCITY DISTRIBUTION OF A GAS IN HEAT CONDUCTION Final Report, 1 Mar. 1968 - 30 Nov. 1973
K. Karamcheti and S. P. Koutsoxannis 1974 26 p refs
(Contract F44620-68-C-0056; AF Proj. 6813; AF Proj. 9783) (AD-A003696; AFOSR-74-1913TR) Avail: NTIS CSCL 07/4

This research program was devoted to various basic experimental and theoretical studies involved in the problem of

deducing the kinetic state of a gas (excited level number densities as well as momentum distributions of excited species) from measurements of properties of the radiation emitted or absorbed by the gas. From the theoretical studies additional information has been obtained concerning (1) the limits of the kinetic-theoretical formulation and the range of validity of the equilibrium as well as non-equilibrium solutions of the Boltzman-type equations involved, (2) the importance of repulsive forces and the sublevel structure of emitter and perturber on the shape of spectral lines and (3) the importance of certain types of gas kinetic collision on line shape asymmetries. Tuned laser absorption and spontaneous emission spectroscopic techniques have been developed and used. This report is intended to serve as a simplified summary of the research project. GRA

N75-27867# Technische Universitaet, Munich (West Germany).
DIFFUSE X-RAY RADIATION SCATTERING ON COPPER AFTER IRRADIATION WITH NEUTRONS AT LOW TEMPERATURES Ph.D. Thesis [DIFFUSE ROENTGENSTREUUNG AN KUPFER NACH BESTRAHLUNG MIT NEUTRONEN BEI TIEFEN, TEMPERATUREN]
Bernd VonGuerard 29 Jul. 1974 87 p refs In GERMAN
Avail: NTIS HC $4.75

Diffuse X-ray scatter measurements on single copper crystals exposed to low temperature neutron irradiation show agglomeration of interstitial atoms but little clustering of vacancies. Heating to 68 K reorients interstitial atoms in the I sub D level with slip ring formations. The diffraction pattern indicates the formation of vacancy loops from about 150 K. Transl. by G.G.

N75-27868# Helsinki Univ. of Technology, Otaniemi (Finland). Dept. of Technical Physics.
MONTE CARLO STUDIES OF NEUTRON TRANSPORT IN COLD NEUTRON FACILITIES Ph.D. Thesis
Heikki Kalli 1974 16 p refs
Avail: NTIS HC $3.25

The Monte Carlo method was applied to the solution of stationary neutron transport problems; the solution was based on two neutron collision density functions. Five papers are briefly summarized; topics discussed include the variance reduction techniques in Monte Carlo solutions of neutron transport problems, Monte Carlo calculations of a hydrogen cold neutron source, Monte Carlo comparison of hydrogen cold neutron sources in radial and tangential beam tube arrangements, Monte Carlo solution of multiple scattering in cold neutron scattering experiments, and the variance reduction in Monte Carlo calculations of multiple scattering in neutron scattering experiments.
M.J.S.

N75-27869# Eidgenossische Technische Hochschule, Zurich (Switzerland).
THE FORMULATION OF MOLECULAR QUANTUM MECHANICS WITH THE AID OF PARTICLE DENSITY OPERATORS AND PHASE OPERATORS Ph.D. Thesis [ZUR FORMULIERUNG DER MOLEKULAREN QUANTENMECHANIK MIT HILFE DES TEILCHENDICHTE OPERATORS UND DES PHASENOPERATORS]
Marcel Schleicher 1974 79 p refs In GERMAN
Avail: NTIS HC $4.75

It is stipulated that a field theoretical formulation of the nonrelativistic quantum mechanical multiple particle problem does not exist that is free of divergence. Molecular quantum mechanical problems for all bound conditions are discussed through numerical approximation in a Hilbert space with impulse limiting functions. It is shown that the Hamilton operator as function of particle density operator and phase operator is a quadratical form of the phase operator. Transl. by G.G.

N75-27870# Eidgenossische Technische Hochschule, Zurich (Switzerland).
THE USE OF ON LINE COMPUTERS FOR NUCLEAR PHYSICS EXPERIMENTS AND APPLICATION FOR MEASUREMENT OF ALPHA-ALPHA BREMSSTRAHLUNG Ph.D. Thesis [DER EINSATZ EINES ON-LINE COMPUTERS FUER KERNPHYSIKALISCHE EXPERIMENTE UND SEINE ANWENDUNG ZUR MESSUNG VON ALPHA-ALPHA-BREMSSTRAHLUNG]
Urs Peyer 1974 51 p refs In GERMAN
(Rept-4966) Avail: NTIS HC $4.25

An on-line computer system is used to analyze double differential effective cross sections for nuclear bremsstrahlung during scattering of alpha particles from a helium target gas in order to determine the effects of resonances. Results confirm that rescattering markedly affects bremsstrahlung scattering cross sections in two particle systems. Transl. by G.G.

N75-27871# Eidgenossische Technische Hochschule, Zurich (Switzerland).
SEMIRIGID ROTATION-INVERSION MODEL FOR MOLECULES WITH C2v FRAME AND C2v INVERTOR SYMMETRY Ph.D. Thesis
Antonio Attanasio 1973 116 p refs
(Diss-5035) Avail: NTIS HC $5.25

The rotation-inversion spectrum of organic molecules was investigated. A quantum mechanical treatment was performed and a hamiltonian matrix was calculated. Irreducible submatrices were diagonalized by means of procedures. Dipole transition moments and selection rules were calculated. Structure relaxation was introduced for the case of the cyanamide molecule, and treated as first order perturbation. Numerical aspects are discussed, and model calculations carried out. Author

N75-27872# Centro de Estudos e Pesquisas, Rio de Janeiro (Brazil).
GENERALIZATION OF THE LORENTZ TRANSFORMATION AND ESTIMATING THE MAXIMUM VELOCITY OF TACHYONS [GENERALIZACAO DA TRANSFORMACAO DE LORENTZ E ESTIMATIVA DA VELOCIDADE TACHYONICA MAXIMA (APENDICE)]
Oriel Nunes Borges and Wilton Moreira BandeiraDeMello 1975 15 p refs In PORTUGUESE
Avail: NTIS HC $3.25

The mathematical possibility is presented of changing a Lorentz Transformation for solving some complex problems in physics such as the existance of the high velocity of light. An extension of the propagation of Einstein's Theory of Relativity is presented, and an equation for estimating the maximum velocity of tachyons is developed. Transl. by F.O.S.

N75-27873# Technische Universitaet, Brunswick (West Germany).
THE STARTING ENERGY OF PRODUCT IONS FROM ION-MOLECULE REACTIONS AND THEIR INFLUENCE ON THE DETERMINATION OF REACTION CONSTANTS BY THE TALROSE METHOD Ph.D. Thesis [DIE ANFANGSENERGIE VON PRODUKT-IONEN VON IONEN-MOLEKUEL-REAKTIONEN UND IHR EINFLUSS BEI DER BESTIMMUNG VON REAKTIONSKONSTANTEN NACH DER TALROSE-METHODE]
Hans-Joachim Drewitz 5 Nov. 1974 108 p refs In GERMAN
Avail: NTIS HC $5.25

Translational energy calculations for secondary ions from ion-molecular interactions in pulsed mass spectrometers are reported on H3(+), D3(+), HeH(+) and CD5(+). Their velocity distributions are approximated by Maxwell-Boltzmann method for an ion source temperature of 457 K. Translational energies for the HeH(+) and CD5(+) ions indicate transfer of a part of the oscillation energy of the reacting primary ion into translational energy for the reaction product. Transl. by G.G.

N75-27874*# California Univ., Los Angeles. School of Engineering and Applied Science.
INTERACTIONS OF SATELLITE-SPEED HELIUM ATOMS WITH SATELLITE-SURFACES. 1: SPATIAL DISTRIBUTIONS OF REFLECTED HELIUM ATOMS
S. M. Liu, W. E. Rodgers, and E. L. Knuth Jun. 1975 43 p refs
(Grant NGR-05-007-416)
(NASA-CR-143111; UCLA-ENG-7546) Avail: NTIS HC $3.75 CSCL 20H

Interactions of satellite-speed helium atoms with practical satellite surfaces were investigated experimentally, and spatial distributions of satellite-speed helium beams scattered from four different engineering surfaces were measured. The 7000 m/sec helium beams were produced using an arc-heated supersonic

molecular beam source. The test surfaces included cleaned 6061-T6 aluminum plate, anodized aluminum foil, white paint, and quartz surfaces. Both in-plane (in the plane containing the incident beam and the surface normal) and out-of-plane spatial distributions of reflected helium atoms were measured for six different incidence angles (0, 15, 30, 45, 60, and 75 deg from the surface normal). It was found that a large fraction of the incident helium atoms were scattered back in the vicinity of the incoming beam, particularly in the case of glancing incidence angles. This unexpected scattering feature results perhaps from the gross roughness of these test surfaces. This prominent backscattering could yield drag coefficients which are higher than for surfaces with either forward-lobed or diffusive (cosine) scattering patterns. Author

N75-27875# Technische Hochschule, Darmstadt (West Germany).
EFFECTIVE INTERACTIONS FOR NUCLEI AT THE BEGINNING OF THE SD-SHELL Ph.D. Thesis [EFFEKTIVE WECHSELWIRKUNGEN FUER KERNE AM ANFANG DER SD-SCHALE]
Hans Feldmeier 24 May 1975 131 p refs In GERMAN
Avail: NTIS HC $5.75

Various effective nucleon interactions in the nuclear shell sd model for Mg-24 are analyzed for effects of quantum space limitations. Optimal interaction parameters are developed by the least squares method. Obtained effective interaction effects contain a relatively strong ALS-part and reproduce experimental data fits much better than usual interaction calculations.
Transl. by G.G.

N75-27876# Wayne State Univ., Detroit, Mich. Research Inst. for Engineering Sciences.
CHEMICAL DYNAMICS BY MOLECULAR BEAM METHODS Final Report, 1 Sep. 1969 - 31 Jul. 1974
E. W. Rothe Dec. 1974 42 p refs
(Grant AF-AFOSR-1799-69)
(AD-A004473; AFOSR-75-0059TR) Avail: NTIS CSCL 07/4

The described research is classified in three separate categories: (a) theoretical analysis of glory scattering experiments; (b) measurements of kinetic energy thresholds (at very high energy resolution) for ion-pair production from molecular collisions, with subsequent derivation of molecular binding energies and electron affinities; and (c) formation of negative ions from high energy collisions of molecules with Cs. References to comprehensive sources are cited. Potential applications are discussed.
GRA

N75-27877# Pennsylvania State Univ., University Park. Dept. of Chemistry.
PROPERTIES OF REACTIVE ATOMIC SPECIES GENERATED AT HIGH TEMPERATURES AND THEIR LOW TEMPERATURE REACTIONS TO FORM NOVEL SUBSTANCES Final Report, 1 Nov. 1970 - 30 Sep. 1974
Philip S. Skell 1975 14 p refs
(Contract AF-AFOSR-1983-71; AF Proj. 9538)
(AD-A004810; AFOSR-75-0200TR) Avail: NTIS CSCL 07/4

A four year program of research is briefly described which involved the generation of atomic species of a number of chemical elements and their reactions with organic compounds to form organometallic compounds. GRA

N75-27878# Illinois Univ., Urbana. Coordinated Science Lab.
SCATTERING OF MOLECULAR HYDROGEN AND ITS ISOTOPES FROM CRYSTAL SURFACES
Raymond Grant Rowe Jan. 1975 136 p refs
(Contract DAAB07-72-C-0259; Grant AF-AFOSR-2210-72)
(AD-A004829; R-669; UILU-ENG-75-2201) Avail: NTIS CSCL 07/4

Molecular beam scattering of a thermal beam of H2 from vacuum cleaved (001) surfaces of MgO and LiF, and (111) surfaces of CaF2 and BaF2 has been examined. The scattering of He, D2 and HD from MgO (001) has also been investigated. The angular distribution of scattered flux indicates strong molecular diffraction from these surfaces. These results indicate that the surface structures of the crystals agree with those of the corresponding bulk planes. In addition to elastic diffraction maxima, strong extra peaks have been observed for hydrogen and its isotopes. GRA

N75-27879# AeroChem Research Labs., Inc., Princeton, N.J.
HIGH-TEMPERATURE FAST-FLOW REACTOR STUDIES OF METAL ATOM/N2O CHEMILUMINESCENCE: THE REACTIONS OF Sn, Al, AND Ba WITH N2O Final Technical Report, 25 Mar. - 30 Nov. 1974
William Felder and Arthur Fontijn Jan. 1975 39 p refs
(Contract N00014-74-C-0327)
(AD-A004202; AeroChem-TP-318) Avail: NTIS CSCL 07/4

The AeroChem high-temperature fast-flow reactor has been adapted for metal atom/N2O chemiluminescence measurements. Chemiluminescence in the 300-750 nm region from metal atom/N2O reactions has been studied in the AeroChem high-temperature fast-flow reactor at pressures from 1 to 50 Torr. All observed SnO emissions are to the X state; many A-X bands not previously reported have been identified. The results suggest the Sn/N2O reaction to be promising as a laser pumping system. No visible emission could be observed from Al/N2O. Specific recommendations for further studies are made based on these results and literature survey. GRA

N75-27880# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DETERMINATION OF THE PROBABILITIES OF A HETEROGENEOUS AND HOMOGENEOUS DEACTIVATION OF MOLECULES OF DEUTERIUM, VOLUME 1
N. G. Fedotov 5 Dec. 1974 18 p refs Transl. into ENGLISH from the book "Goreniye" Moscow, Izd vo Nauka, 1972 p 654-657
(AD-A004527; FTD-MT-24-2005-74) Avail: NTIS CSCL 07/4

Experiments were conducted to determine the upper limit of the ignition of fluorine-deuterium mixture without diluent. Results are presented and discussed. M.J.S.

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N75-27881# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ADJUSTMENT AND OPERATION IN A PULSED MODE OF THE ELECTROSTATIC ACCELERATOR EG-1 OF THE PHYSICAL ENERGY INSTITUTE
V. Volodin and A. I. Glotov 20 Dec. 1974 13 p refs Transl. into ENGLISH from the monograph "Trudy 2 Vsesoyuznogo Soveshchaniya po Uskoritelyam Zaryazhennykh Chastis" Moscow, 1972 p 113-114
(AD-A004437; FTD-HC-23-2819-74) Avail: NTIS CSCL 20/7

In order to conduct experiments in nuclear physics with the use of the time of flight method in the region of neutron energies on the order of a kiloelectronvolt, the electrostatic accelerator EG-1 was converted into a pulsed system by the development of a pulsed ion source. GRA

N75-27882# Naval Postgraduate School, Monterey, Calif.
ELECTROEXCITATION OF GIANT RESONANCES BETWEEN 5 MeV EXCITATION ENERGY IN 165 Ho M.S. Thesis
Gerald Lee Moore Dec. 1974 63 p refs
(AD-A004557) Avail: NTIS CSCL 20/8

Giant resonances in 165Ho were studied with inelastic scattering of electrons with 60 MeV to 105 MeV incident energy at a scattering angle of 75 degrees. From 5 MeV to 30 MeV excitation energy, five multipole resonances were observed of which only the dipole resonances have been previously reported. Reduced transition probabilities and multipolarity assignments have been made. The five resonances were observed at excitation energies of 9.6 (E0 or E2), 11.5 (E2), 12.3 (E1), 15.8 (E1), and 23.5 MeV (E2). The splitting of the dipole resonance observed in photonuclear reaction experiments with

prolate spheroid nuclei are confirmed with inelastic electron scattering. GRA

N75-27883# Michigan Univ., Ann Arbor. Dept. of Mechanical Engineering.
SODIUM CAVITATION DAMAGE TESTS IN VIBRATORY FACILITY-TEMPERATURE AND PRESSURE EFFECTS
F. G. Hammitt and N. R. Bhatt Dec. 1974 17 p refs Sponsored by CEN
(PB-239813/9; UMICH-320198-1-I) Avail: NTIS HC $3.25 CSCL 08I

Cavitation damage data is reported for tests in sodium and water in a vibratory facility (20kHz, 51 micrometers double amplitude) over the temperature range 300-500C at suppression pressure (NPSH/density) of 3 bar on stainless steel type 316 L. The results are compared with other pertinent related data. Maximum damage temperature is of the order of 300C and thus is in the range of reactor operation for LMFBR, whereas this is not the case for water-cooled power reactors as PWR and BWR, where the maximum cavitation damage temperature is far below operating temperature. At their respective maximum damage temperatures, cavitation damage potential for water and sodium are of the same order of magnitude. Attempts are made to generalize existing results for various cavitating liquids. GRA

N75-27884# Massachusetts Inst. of Tech., Cambridge.
COUNTER-FLOW CRITICAL HEAT FLUX RELATED TO REACTOR TRANSIENT ANALYSES Interim Report
Joseph Patrick Walkush and Peter Griffith Jan. 1975 60 p refs Sponsored by Electric Power Res. Inst.
(PB-240798/9; EPRI-292-2) Avail: NTIS HC $4.25 CSCL 08I

The experimental results of a program in counter-current critical heat flux are presented. These experiments were performed with Freon 113 at 200 psia to model a high-pressure water system. An internally heated annulus was used to model a fuel pin in a channel. Only low flowrates were examined. The flow regime was always bubbly or slug, with the liquid primarily on the walls. It was found that critical heat flux (chf) of about .9 of the pool boiling value can be expected for up to 20% void. Beyond this, the CHF value decreases uniformly with void. Void fractions up to 70% were investigated, with the results being slightly below those of a similar experiment carried out at atmospheric pressure. GRA

N75-27885# Eastern Environmental Radiation Lab., Montgomery, Ala.
A COMPARISON OF CaF2:Mn AND LiF THERMOLUMINESCENT DOSIMETERS FOR ENVIRONMENTAL RADIATION MONITORING Final Report
J. E. Partridge, S. T. Windham, J. Eakins, and J. Lochamy Dec. 1973 14 p refs
(PB-239725/5; EPA-520/5-73-006) Avail: NTIS HC $3.25 CSCL 18D

Two types of thermoluminescent dosimeters, commonly used for environmental radiation monitoring, were evaluated and compared. The study consisted of approximately four months of field evaluation as part of a pre-operational survey at a nuclear power plant. The evaluation consisted of comparing the average microroentgens/hr readings obtained at each of eight sites for the period of the study. The precision of reproducibility for both systems was determined to be approximately 3%. The difference in the average microroentgens/hr readings for the two systems ranged from 16% to 30% at the various sites. GRA

74 OPTICS

Includes light phenomena.

N75-27886 British Library Lending Div., Boston Spa (England).
REFLECTOR SURFACE OF 6-METRE MILLIMETRE-WAVE TELESCOPE
K. Akabane et al 9 Dec. 1974 38 p refs Transl. into ENGLISH from Tokyo Astron. Observ. Bull. (Tokyo), v. 16, no. 3, Apr. 1973 p 471-499
(BLL-Trans-3162-(9022.81)) Avail: British Library Lending Div., Boston Spa., Engl.: 4 BLL photocopy coupons

The fabrication, calibration, and positioning of a large radio telescope reflector is presented. Telescope optics and atmospheric conditions affecting reflector efficiency are discussed. J.R.T.

N75-27887 British Library Lending Div., Boston Spa (England).
SPECTRAL CHARACTERISTICS OF CONTRAST: LUMINESCENT SCREENS
M. P. Znachenok, N. P. Kupreichik, and K. G. Predko 31 Jul. 1974 7 p refs Transl. into ENGLISH from Zh. Prikl. Spektrosk. (BSSR), v. 4, no. 18, Apr. 1973 p 648-652
(BLL-Trans-866-(9022.64)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

The quality of an image is described by the frequency-contrast characteristic (FCC) which indicates the dependence of modulation depth on spacial frequency in the image of a plate with sinosoidal dashes for measurements of absolute contrast. Contrast screens in which the phosphor layer has a low reflection factor or the bottom of the kinescope is made of a neutral light filter (grey glass) are used in electron beam instruments to avoid impairment of FCC. The effect of spectral characteristics of contrast screens, of the emission spectrum of the phosphor, and of the external illumination on the FCC is investigated and evaluated for when the image is observed over a wide wavelength range of light. Author

N75-27888 California Inst. of Tech., Pasadena.
ANALYSIS OF OBJECT-IMAGE RELATIONSHIPS IN ELECTRON MICROSCOPY BY IMAGE PROCESSING TECHNIQUES Ph.D. Thesis
Henri Michel Horgen 1975 399 p
Avail: Univ. Microfilms Order No. 75-9527

It is shown that the correspondence between the object and the image can be linked to the electron optical characteristics of the instrument and to the statistical properties of the noise. The image formation of a cluster of atoms is discussed to demonstrate the main contrast mechanisms that operate at the atomic level and a wave optical theory of image formation is developed to present the concept of the amplitude transfer function. For weakly scattering objects, there exists a linear relationship between the image intensity in bright-field and the total object wave. Phase and amplitude contrast transfer functions describe the perturbing influence of the objective lens aberrations on the phase and the amplitude of the object wave. Approximations of the wave optical theory are checked by studying the effect of defocusing on the transfer conditions of the phase and amplitude contrast mechanisms. Dissert. Abstr.

N75-27889 Pennsylvania Univ., Philadelphia.
SYNTHETIC LIGHT CURVES OF FOUR CONTACT BINARIES Ph.D. Thesis
Theresa Ann Nagy 1974 418 p
Avail: Univ. Microfilms Order No. 75-14604

A computer program for the computation of synthetic light curves was developed and applied to contact binary systems. The computational efficiency of this computer program was found to be at least three times faster than other programs currently in use. The geometry of the surface of the binary system was formulated in the circular cylindrical coordinate system which lends itself well to computational efficiency and is based on the centrally-condensed Roche model. Second order limb darkening was used in the computations, and the limb darkening coefficients were derived from the model-atmosphere grids of Kurucz, Carbon and Gingerich. The gravity coefficient is computed from the tables of mean values given as a function of spectral type given by Binnendijk. The computation of the relative light curve was done in terms of surface brightness as opposed to the effective temperature. A differential correction process was implemented to maximize agreement between the computed synthetic light curve and the observed light curve for a given binary system. Dissert. Abstr.

N75-27890*# Kanner (Leo) Associates, Redwood City, Calif.
THEORETICAL AND EXPERIMENTAL STUDY OF THE DEPOLARIZATION OF THE RAYLEIGH RADIATION SCATTERED BY COMPRESSED RARE GASES
M. Thibeau, B. Oksengorn, and B. Vodar Washington NASA Jul. 1975 25 p refs Transl. into ENGLISH from J. Phys.

(Paris), v. 29, no. 4, Apr. 1968 p 287-296
(Contract NASw-2481)
(NASA-TT-F-16445) Avail: NTIS HC $3.25 CSCL 20F

A theoretical interpretation is presented of the pressure-induced depolarization of the Rayleigh light scattered by compressed rare gases. The calculation is based on the hypothesis of fluctuations for the effective field in connection with the induced dipole interaction. For low gas densities, the cancellation due to a regular environment is taken into consideration. Theoretical values of the depolarization ratio, given by this interpretation, are compared with those obtained in experiments on compressed argon, between 15 and 1500 bars. The agreement is good in the low density range, but becomes poor for high densities. Author

N75-27891# Naval Research Lab., Washington, D.C.
SPECTRAL IRRADIANCE ENHANCEMENT FROM A LONG ARC XENON LAMP IN THE 460-495 nm BANDWIDTH WITH METAL ADDITIVES
R. G. Hughes Dec. 1974 49 p refs
(NRL Proj. 84G01-03)
(AD-A004592; NRL-MR-2944) Avail: NTIS CSCL 13/1

Long range, wide angle, deep ocean photographic systems require an intense, efficient, auxiliary lighting system due to the lack of sufficient natural illumination in the visible wavelength band and the magnitude of optical attenuation. A method of enhancing the spectral output from a pulsed long arc Xenon lamp in the 460-495 nm bandwidth, using metal additives was investigated. The light output from the lamp was generated by discharging a single mesh capacitor bank through the lamp. Initiation of the current pulse in the lamp was accomplished via an external trigger wire. Metal additives tested in the lamps included zinc, cadmium, and bismuth tri-iodide. Additive lamps with combinations of zinc and cadmium and bismuth tri-iodide; and cadmium and zinc were also fabricated. GRA

N75-27892# Temple Univ., Philadelphia, Pa. Dept. of Chemistry.
STUDY OF THE MECHANISM OF DYNAMIC SCATTERING IN NEMATIC LIQUID CRYSTALS SUITABLE FOR DISPLAY APPLICATIONS Final Technical Report, 1 Feb. 1972 - 30 Jun. 1974
Mortimer M. Labes and Arnold I. Baise Sep. 1974 74 p refs
(Contract F33615-72-C-1441; AF Proj. 7367)
(AD-A004201; AFML-TR-74-190) Avail: NTIS CSCL 20/6

Several new stable nematic liquid crystals were synthesized for possible use in dynamic scattering, and the threshold for scattering in an azoxy-type liquid crystal was lowered significantly by the use of charge-transfer acceptors as dopants. The effect of large changes in dielectric anisotropy on twisted nematic devices has been examined, and significant improvements in the decay times for this effect were achieved by using a two-frequency addressing mode. Studies on the electric field-induced cholesteric-nematic transition have shown that a non-uniform distortion of the cholesteric helix occurs under certain conditions. An o-hydroxy substituted analog (OHMBBA) of the room temperature nematic N-(p-methoxybenzylidene)-p-n-butylaniline (MBBA) was prepared. Two broad temperature range binary systems were also examined consisting of OHMBBA mixed with N-(p-ethoxybenzylidene)-p-n-butylaniline (EBBA), and OHMBBA mixed with N-(p-methoxybenzylidene)-p-n-pentylaniline (MPBA). GRA

N75-27893# Intelcom Rad Tech, San Diego, Calif.
ANALYSIS OF PERFORMANCE OF IR DETECTORS UNDER RADIATION ENVIRONMENTS Scientific Report, 1 Jul. 1973 - 30 Jun. 1974
Roland E. Leadon, Barry A. Green, Robert A. Berger, and Rudolfo A. Cesena 24 Jul. 1974 73 p refs
(Contract F19628-72-C-0349)
(AD-A004156; RT-8028-006; SR-2) Avail: NTIS CSCL 17/5

A mathematical computer model has been developed for the transient response of silicon photoconductive IR detectors at low temperatures. Predicted responses are compared to measured time histories resulting from short-pulse Linac excitations. The model is used to predict the response of the detector to single gamma events and to explain the memory effect of a moving IR spot. Future work will use the model to investigate the spontaneous spiking noise of biased photoconductive detectors and the response of photovoltaic detectors. Experimental spiking and photovoltaic detector data are presented for use in these analyses. GRA

N75-27772 Joint Publications Research Service, Arlington, Va.
SOME ASPECTS OF THE DESIGN OF OPTRON WITH FIBER LIGHT GUIDE
T. N. Tischenko *In its* Opt. and Electroopt. Data Process. (JPRS-64938) 6 Jun. 1975 p 14-17 ref Transl. into ENGLISH from the book "Opticheskaya i Elektroopticheskaya Obrabotka Informatsii" Moscow, Izdatelstvo Nauka, 1974 p 146-149
(For availability see N75-27769 18-59)

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N75-27894 California Univ., Davis.
A NUMERICAL CALCULATION OF THE FLOW AND ELECTRICAL CHARACTERISTICS OF AN ARGON INDUCTION DISCHARGE Ph.D. Thesis
Jacques Alain Delettrez 1974 143 p
Avail: Univ. Microfilms Order No. 75-15427

The magnetohydrodynamic equations which describe the flow of a conducting fluid are solved by the use of the alternating direction implicit difference method to predict the temperature, density and velocity profiles in an induction plasma torch. A simplified two-dimensional model of the torch is presented to permit the solution of the MHD equations and justification for the simplifications is given. A conservative alternating direction implicit difference method is derived and the method of solution of the set of difference equations is presented. Finally a computer code is written to compute the solution to the set of difference equations. The temperature profile calculated does not differ from that obtained by simpler models. The presence of an inward radial magnetic force creates a vortex and a stagnant area at the top of the flame. Dissert. Abstr.

N75-27895 California Univ., Davis.
GUIDING CENTER SIMULATION OF TOROIDAL PLASMAS Ph.D. Thesis
Thomas Hawkins Johnson 1974 294 p
Avail: Univ. Microfilms Order No. 75-15438

A computer simulation method for axisymmetric toroidal plasmas is developed. The method comprises two separate physical models representing different components of an experimental plasma. The first model is an MHD fluid equilibrium representation; the technique devised for the solution of this equilibrium is several times faster than any currently in common use. The second model is a macroparticle representation which uses guiding-center formalism for the particles' velocities and positions; consequently, the timestep used by this model may be many times longer than those possible for conventional macroparticle simulations. A new computer code, GUIDON, which incorporates these models with solution for self-consistent magnetic fields, is presented. Special features of the guiding-center model are discussed in detail. Results of simulations using GUIDON are also presented. Dissert. Abstr.

N75-27896 Adelphi Univ., Garden City, N.Y.
DRIFT WAVE STABILITY OF AN INHOMOGENEOUS MAGNETIC PLASMA WITH AN ELECTRON CURRENT IN A CROSSED, HIGH FREQUENCY APPLIED ELECTRIC FIELD Ph.D. Thesis
Irwin Leigh Weiss 1975 369 p
Avail: Univ. Microfilms Order No. 75-15185

An inhomogeneous plasma immersed in a constant magnetic field can support drift waves which result in enhanced diffusion and reduced confinement time. It was shown how drift waves may be stabilized by the application of an alternating electric field perpendicular to the magnetic field. A review of drift waves is made based on kinetic theory and the drift wave frequency and growth rate is developed. After constructing a background distribution function which includes the plasma

inhomogeneities as density and temperature gradients, the first order Vlasov collisionless equation is solved for the perturbed distribution function using the method of characteristics. Longitudinal plasma waves are assumed and use is made of the local approximation. In addition, the ratios of density gradient to density and temperature gradient to temperature are assumed to be much less than the plasma wave number. Dissert. Abstr.

N75-27897# Nagoya Univ. (Japan). Inst. of Plasma Physics.
MODIFIED CLEMMOW-MULLALY-ALLIS DIAGRAM FOR LARGE-AMPLITUDE ELECTROMAGNETIC WAVES IN MAGNETOPLASMAS
K. Minami, Y. Mori, and S. Takeda Feb. 1975 18 p refs
(IPPJ-214) Avail: NTIS HC $3.25

A possible modification to the Clemmow-Mullaly-Allis diagram is analyzed taking into account the radiation pressure force due to a large amplitude, electromagnetic field E in magnetoplasmas. Electromagnetic waves incident normally on a semi-infinite uniform plasma are analyzed, on which B static magnetic field is applied parallel and/or perpendicular to the surface. Considerations are limited to a cold collisionless plasma where the incident waves are evanescent. Simple expressions are obtained for the cut-off conditions of the waves except the extraordinary mode.
Author

N75-27898# Nagoya Univ. (Japan). Inst. of Plasma Physics.
A SYNCHRONIZED RADIAL DIFFUSION WAVE
J. Uramoto May 1975 20 p refs
(IPPJ-220) Avail: NTIS HC $3.25

By applying low frequencies radially between a chamber wall and a plasma column along a uniform magnetic field, a radial standing-like diffusion wave is found at a synchronized frequency whose half period is equal to a diffusion time. The radial diffusion wave is explained from superposing a radial diffusion stream effect on a radial plasma resistance characteristic.
Author

N75-27899*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
IONIZING MECHANISMS IN A CESIUM PLASMA IRRADIATED WITH A RUBY LASER
K. Shimada and L. B. Robinson 1 Jun. 1975 15 p refs
(Contract NAS7-100)
(NASA-CR-143131; JPL-TM-33-730) Avail: NTIS HC $3.25 CSCL 20I

A cesium filled diode--laser plasmadynamic converter was built to investigate the feasibility of converting laser energy to electrical energy at large power levels. Experiments were performed with a pulsed ruby laser to determine the quantity of electrons and cesium ions generated per pulse of laser beam and to determine the output voltage. A current density as high as 200 amp/sq cm from a spot of approximately 1 sq mm area and an open circuit voltage as high as 1.5 volts were recorded. A qualitative theory was developed to explain these results. In the operation of the device, the laser beam evaporates some of the cesium and ionizes the cesium gas. A dense cesium plasma is formed to absorb further the laser energy. Results suggest that the simultaneous absorption of two ruby laser photons by the cesium atoms plays an important role in the initial ionization of cesium. Inverse bremsstrahlung absorption appears to be the dominant mechanism in subsequent processes. Recombinations of electrons and cesium ions appear to compete favorably with the simultaneous absorption of two photons.
Author

N75-27900# Los Alamos Scientific Lab., N.Mex.
TOROIDAL MODE STRUCTURE IN THE SCYLLAC FULL TORUS
F. C. Jahoda, R. Kristal, and W. E. Quinn Jan. 1975 4 p refs
(Contract W-7405-eng-36)
(LA-5853-MS) Avail: NTIS

A 360 deg multiple-slit framing camera (11 viewing slits) shows that the Scyllac toroidal mode structure is consistent in a statistical sense with the m=1 instability predictions of MHD sharp-boundary theory. The first few modes of finite wavelength around the torus have growth rates comparable to the K=0 mode, and the developed plasma mode structure approaches cut-off at the theoretical value given by magnetic field bending effects. The data indicate that the m=1 instability rather than loss of equilibrium terminates the plasma confinement.
Author (NSA)

N75-27901# RAND Corp., Santa Monica, Calif.
US AND SOVIET MHD TECHNOLOGY: A COMPARATIVE OVERVIEW
G. Rudins Jan. 1974 112 p refs
(Contract DAHC15-73-C-0181; ARPA Order 189-1)
(AD-A004614; R-1404-ARPA) Avail: NTIS CSCL 10/2

The present Report, in successive sections, briefly reviews MHD technology, traces the evolution of the MHD programs in the United States and U.S.S.R. and their respective development approaches, and compares major U.S. and U.S.S.R. MHD facilities and national program objectives.
GRA

N75-27902# Dewey Electronics Corp., Paramus, N.J.
A CONTINUATION OF LABORATORY STUDIES OF VLF PROPAGATION EFFECTS IN THE SIMULATED DISTURBED SUB-D REGION Final Report, 1 May 1968 - 30 Jun. 1973
Merle N. Hirsh and Philip N. Eisner 25 Nov. 1974 53 p refs
(Contract DASA01-68-C-0159)
(AD-A004678; DNA-3244) Avail: NTIS CSCL 07/4

Ion collision frequencies and ion removal rates due to ion-ion recombination have been deduced from mass spectrometer and conductivity probe measurements in the afterglow of laboratory plasmas produced by high-energy electron bombardment of airlike N2:O2 mixtures at ionospheric pressures. Previous work has shown that the ion species and reaction rates determined from this laboratory plasma are in general agreement with those observed in the ionosphere. The results obtained in this work are relevant to the calculation of VLF and ELF skywave propagation in a disturbed ionosphere.
GRA

N75-27903# Naval Research Lab., Washington, D.C.
PARAMETRIC DECAY OF INTENSE RADIATION INTO A WHISTLER WAVE Interim Report
H. H. Klein, Wallace M. Manheimer, and Edward Ott Jun. 1974 7 p refs Sponsored in part by ERDA
(NRL Proj. 77H02-29)
(AD-A004626; NRL-MR-2827) Avail: NTIS CSCL 20/9

The parametric decay instability of a large amplitude extraordinary pump wave into a whistler wave and a backscattered extraordinary wave is investigated by computer simulation.
GRA

N75-27904# Naval Research Lab., Washington, D.C.
STUDIES OF PLASMA CONTAINMENT IN CUSP MAGNETIC FIELD FOR TWO LINER SHAPES Interim Report
Paulette C. Liewer and Jay P. Boris Jul. 1974 12 p refs
(NRL Proj. 77H02-28F; RR0110941)
(AD-A004627; NRL-MR-2851) Avail: NTIS CSCL 20/9

This note summarizes preliminary computational studies made of plasma confinement in a cusp magnetic field created by liners or coils of two different shapes. The amount of plasma contained was calculated at several radial positions of the liner to model a liner moving inward. It was found that the liner shape and position are important in achieving the lowest ratio of field to plasma energy and hence maximizing the efficiency of the compression. The results suggest further studies requiring a more sophisticated program now under development.
GRA

N75-27905# Naval Research Lab., Washington, D.C.
A COLLECTION OF PLASMA PHYSICS FORMULAS AND DATA
David L. Book and A. W. Ali Jan. 1975 82 p refs
(AD-A004601; NRL-MR-2898) Avail: NTIS CSCL 20/9

A collection of plasma physics formulas and data is compiled, with instructions for use. Topics discussed include the following: Vector formulas; Dimensions and units; Physical constants; Electricity and Magnetism; Maxwell's equations; AC circuits; Plasma dispersion function; Fundamental plasma parameters; Approximate magnitudes in typical plasmas; Collisions and transport; Ionospheric parameters; Electrostatic streaming instabilities; CTR; Dimensionless numbers of fluid mechanics; Shocks; Relativistic electron beams; Important laser systems; Atomic and molecular physics.
GRA

N75-27906# Naval Research Lab., Washington, D.C.
SATURATION OF THE RELATIVISTIC TWO STREAM INSTABILITY BY ELECTRON TRAPPING
Martin Lampe and P. Spangle Dec. 1974 33 p refs
(NRL Proj. H02-26A)
(AD-A004593; NRL-MR-2948) Avail: NTIS CSCL 20/9

The single-wave weak cold relativistic two-stream instability has been studied in one dimension by numerical integration of the equations of motion, energy conservation, and Poisson's equation. GRA

N75-27907# Naval Research Lab., Washington, D.C.
THE EFFECT OF THE BEAM ON THE SIGNAL OF DIAMAGNETIC LOOPS IN BEAM-PLASMA HEATING EXPERIMENTS
C. D. Striffler and C. A. Kapetanakos Nov. 1974 35 p refs
(NRL Proj. 77H02-28)
(AD-A004178; NRL-MR-2928) Avail: NTIS CSCL 20/9

The effect of an electron beam on the output signal of a diamagnetic loop, used in beam-plasma heating experiments, is studied by examining the diffusion of a magnetic field pulse through a cylindrically symmetric plasma column. The magnetic field pulse is produced by a thin rotating E-layer of linear current I(t) that has a trapezoidal shape in time. Exact analytical experssions are obtained for the electric and magnetic fields and for the integrated output of a diamagnetic loop placed outside the plasma column. It is shown that the present results are not sensitive to the shape of the beam current pulse. GRA

N75-27908# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE INTERACTION OF SLOW PARTICLES WITH MATTER AND PLASMA DIAGNOSTICS
Yu. V. Gott and Yu. N. Yavlinskii 17 Dec. 1974 158 p refs
Transl. into ENGLISH of the monograph "Vzaimodeistvie Medlennykh Chastits s Veshchestvom i Diagnostika" USSR, 1973 p 1-128
(AD-A004514; FTD-HC-23-2174-74) Avail: NTIS CSCL 20/9

The question of the interactions of slow particles (of energy less than 50 KeV) with solids is considered in this bock. The authors describe the current theoretical and experimental status of the investigations of the energy loss and range of particles in matter, proton charge exchange, and proton scattering in traversing a layer of matter. Experimental methods which are applicable to this type of research are described. Methods of obtaining very thin layers of material to study (without backing), which are used as targets, are discussed in detail. The last part is devoted to the application of the phenomena investigated to corpuscular diagnostics of laboratory and cosmic plasma. GRA

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N75-27909 British Library Lending Div., Boston Spa (England).
ON THE CHARACTERISATION OF HIGHLY DOPED Ga-As SINGLE CRYSTALS
M. Schulz, B. Schumann, R. Sarodnik, and H. Schaefer 9 Dec. 1974 23 p refs Transl. into ENGLISH from Krist. Tech. (East Germany), v. 8, no. 12, 1973 p 1421-1438
(BLL-TRANS-3158-(9022.81)) Avail: British Library Lending Div., Boston Spa, Engl.: 3 BLL photocopy coupons

Investigations of structure defects in high Sn doped GaAs monocrystals grown by the liquid encapsulation technique were carried out using etch techniques, infrared microscopy, and X-ray topography. Specific defects in connection with inhomogeneous insertion of the dopand caused by constitutional supercooling and cellular growth were observed. The geometry, the distribution and the cause of the occurrence of these defects are described. The effect of the defects on the luminescence is investigated. Author

N75-27910 British Library Lending Div., Boston Spa (England).
EFFECT OF GROWTH CONDITIONS OF TRIGLYCINESULPHATE AND TRIGLYCINESELENATE CRYSTALS ON THE CHARACTER OF THE SPECIFIC RESISTANCE VARIATION
L. N. Margolin and M. S. Tsedrik 27 Feb. 1974 6 p refs
Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Fiz., (USSR), pt. 12, 1972 p 143-146
(BLL-Trans-881-(9022.64)) Avail: British Library Lending Div., Boston Spa, Eng.: 1 BLL photocopy coupon

To clarify the peculiarities of phase transitions in TGS crystals and other isomorphous crystals, an investigation was conducted of the effect of growth conditions of single crystals of TGS and TGSel on the variation of the specific resistance with time. The equipment used for studying the variation of the specific resistance consisted of a teraohmmeter with an external high-stability source of test voltages, a recorder, a special chamber for the specimen under investigation, and a thermostatic device. All measurements with specimens of TGS and TGSel crystals were carried out in the air atmosphere. Prior to each measurement, the specimens were kept in the chamber at a given temperature for 1.5-2 hours. The study of the ferroelectric absorption was carried out in the ferroelectric direction at a stabilized temperature of 20 C for TGS crystals and of 15 C for TGSel crystals at the testing electric field intensities of 65.5, 625 and 1250 V./cm. Results are presented and discussed. Author

N75-27911 Utah State Univ., Logan.
A THEORETICAL PROTON PROTON PAIR PRODUCTION CROSS SECTION CALCULATION Ph.D. Thesis
Jay Wesley Phippen 1974 129 p
Avail: Univ. Microfilms Order No. 75-14464

The calculation of both electron-pair and muon-pair production cross-sections was made using Feynman's quantum electrodynamics. Psuedo-scalar coupling was used between the nucleons, and vector coupling was used between the photon and the fermions. The protons were considered as Dirac particles. Eight fourth-order Feynman-Dyson diagrams were used. The subsequent sixty-four TRACES were reduced to seven basic topologically different TRACES, and from the seven basic TRACES, it was possible to generate the sixty-four TRACES by the proper permutations of the variables. With the mathematics and the corresponding computer programs written down, data (energies and momenta which represent the kinematics of the reaction) were needed. Using a Monte Carlo method, random relativistically invariant data were generated and then substituted into the computer programs from which pair production cross-sections were calculated. Dissert. Abstr.

N75-27912 North Carolina State Univ., Raleigh.
CONTACT NUCLEATION OF VARIOUS CRYSTAL TYPES Ph.D. Thesis
Clifford Yi-der Tai 1974 127 p
Avail: Univ. Microfilms Order No. 75-15167

Studies on contact nucleation were extended to include two inorganic hydrates -- (MgSO4)(7H2O) and (KA1(SO4)2)(12H2O), one inorganic anhydrate -- K2SO4 and one organic hydrate -- (C6H8O7)(H2O). The numbers of nuclei generated by contact nucleation were evaluated by counting crystals formed by impacting a properly aligned growing crystal surface with a cylindrical metal rod. Several operating variables were studied with particular emphasis on supersaturation, impact energy, crystal temperature, and growth rate. Nuclei were produced by impact for all systems, even at low supersaturations. A threshold energy below which no nuclei were formed was found for K2SO4. The crystal temperature appeared to be an important factor in contact nucleation as more nuclei were generated at higher temperatures and constant supersaturation; activation energies were determined for both inorganic hydrates. Dissert. Abstr.

N75-27913 Rochester Univ., N.Y.
LOW MOMENTUM TRANSFER PROTON-PROTON ELASTIC SCATTERING UP TO 400 GeV Ph.D. Thesis
Dan A. Gross 1974 214 p
Avail: Univ. Microfilms Order No. 75-15203

A hydrogen jet target was used to study proton-proton scattering. The target was installed in the internal beam of the NAL accelerator, and solid state detectors were used to detect the low energy recoils. A total of about 14,000,000 elastic events, equally divided between the two phases of the experiment, were

obtained in the study of the low momentum transfer scattering. The forward diffraction peak and the real-to-imaginary ratio of the nuclear scattering amplitude energy dependence were derived in the range 40 to 400 GeV/c, laboratory momentum. The results indicate a continuing shrinkage of the forward peak, even if at a reduced rate from Serpukhov energies. The zero-crossing of the real-to-imaginary ratio at about 300 GeV is evidence for the rise in the total cross section in the NAL infrared scanning radiometer. Dissert. Abstr.

N75-27914 Yale Univ., New Haven, Conn.
PROPERTIES OF CRYSTALS WITH LINEAR AND CIRCULAR BIREFRINGENCE Ph.D. Thesis
Chen-Cheng William Yu 1974 136 p
Avail: Univ. Microfilms Order No. 75-15403

The linear and circular birefringence of a sample can be determined by measuring the state of polarization change when an elliptically polarized light passes through the sample. The measuring system consists of a polarizer, two quarter plates, and an analyzer. The polarizer and the first quarter wave plate are used to generate the elliptically polarized light while the second quarter wave plate and the analyzer are used to detect the state of polarization of the light emerging from the sample. An optical synthesis method is employed to design the optimum arrangement for the measurement of samples of specific linear and circular birefringence. The dependence of the sensitivity of the measurement on the sample thickness is also carefully examined. Two special cases in which either the linear birefringence or the circular birefringence is weak are discussed.
Dissert. Abstr.

N75-27915 Syracuse Univ., N.Y.
A SURFACE ACOUSTIC WAVE DEVICE FOR OBTAINING DIRECT ELECTRONIC FOURIER TRANSFORMS OF IMAGES Ph.D. Thesis
Neng-Tze Yang 1974 122 p
Avail: Univ. Microfilms Order No. 75-14037

A one-dimensional acoustic surface wave direct electronic Fourier transform (DEFT) camera was fabricated and evaluated. This device employs the elastophotoconductance mechanism (the interaction of a surface acoustic wave with a photo-conductive CdS polycrystalline film), creating electrical signals proportional to a spatial Fourier transform of the image incident on it. In this device, the surface acoustic wave is generated by a wedge mounted transducer and is propagated along a polycrystalline CdS film, which was evaporated on a fused quartz substrate. As the transducer frequency is swept, the output signal indicates the magnitudes and phases of the Fourier components of the one-dimensional image. The DEFT camera demonstrated the ability to distinguish between similar black and white patterns through the predicted amplitude responses and the linear relationship of the phase versus the position changes of an image as indicated by the shifting theorem of the Fourier transform.
Dissert. Abstr.

N75-27916 Missouri Univ., Columbia.
MASS ACTION LAW FOR ADDITIVE COLORATION OF BaO Ph.D. Thesis
John Dwane Foster 1974 69 p
Avail: Univ. Microfilms Order No. 75-15993

The additive coloration process for BaO is more involved than for the other alkaline earth oxides because the F centers are partially ionized even at room temperature. Crystals of BaO were additively colored at 100 K intervals between 1423 and 1723 K in barium vapor at pressures from .0007 to 1.7 torr. Special precautions were necessary to avoid extraneous results due to the high vapor pressure of BaO and the high reactivity of the BaO crystal and vapor with the metal of the bomb. By assuming that the F centers are singly ionized at the coloring temperature, a good fit was obtained. Departures from this relationship at low densities and high temperatures were attributed to experimental difficulties. Dissert. Abstr.

N75-27917 Missouri Univ., Rolla.
CROSS SECTIONS FOR PHOTOIONIZATION OF THE 6P-2 FINE STRUCTURE LEVELS OF CESIUM Ph.D. Thesis
John Daniel Jones 1974 68 p
Avail: Univ. Microfilms Order No. 75-15828

The cross sections for photoionization of excited cesium from the 6P-2 sub (3/2) and 6P-2 sub (1/2)-fine structure levels were measured using a triple crossed-beam apparatus. Two photon beams, one for excitation and one for ionization, impinge upon an atomic beam and produce ions at the point of intersection. The relative cross section was determined from a knowledge of the ion count rate and the relative photon flux of the ionization light. The results are normalized to available theoretical calculations and compared with recombination measurements in cesium plasmas. The present cross sections are found to decrease the decreasing wavelength more rapidly than predicted by theory, but are in excellent agreement with previous experimental studies of the combined 6P-2 stated. Dissert. Abstr.

N75-27918 Colorado Univ., Boulder.
TIME-ORDERED UNIFIED CLASSICAL PATH THEORY OF STARK BROADENING: APPLICATION TO He 2 Ph.D. Thesis
Ronald Lewis Greene 1974 213 p
Avail: Univ. Microfilms Order No. 75-13429

The problem of Stark broadening in singly ionized helium was examined in the context of the unified classical path theory of Smith, Vidal, and Cooper. The previously neglected time-ordering of the time development operator is included by means of a technique adapted to line broadening by Lisitsa and Sholin. The technique was used in a one-electron calculation of the Lyman-alpha line of hydrogen, and the results compared with two previous time-ordered calculations. One manifestation of the Coulomb attraction between charged radiators and perturbing electrons occurs in the quasi-static limit. Detailed calculations were performed for the Lyman-alpha line of He II. Comparison of the time-ordered results with similar results which neglect time-ordering shows that inclusion of time-ordering causes a reduction in the intensity in line center and an increase in the half-width of the line. Dissert. Abstr.

N75-27919 Texas Univ., Dallas.
MULTIPHOTON IONIZATION OF CESIUM THROUGH RESONANT DISSOCIATE STATES OF Cs2 Ph.D. Thesis
Muhammad Yaqub Mirza 1974 124 p
Avail: Univ. Microfilms Order No. 75-13934

The multiphoton excitation of cesium through potentially resonant continuum molecular states was investigated over the 6200 to 5000 A wavelength region with a tunable dye laser source having a 0.06 to 0.08 A linewidth and a space charge ionization detector sensitive to a few ions per second. Conditions are established under which the lifetime of the resonant intermediate state against photoexcitation exceeds the lifetime against dissociation. Single and double photon resonances occur for the same wavelength and give absorption maxima corresponding to the line spectrum from the intermediate state following dissociation. These lines are modulated in amplitude as a function of wavelength by the more slowly varying absorption resonance from the initial to the intermediate continuum state. As a consequence, the resulting dispersion curve for two-photon absorption in cesium shows what appear to be resonant intermediate terms dissociating to give a 5 2D atom and resulting in the strong development of features corresponding to the Fundamental Series of atomic cesium in absorption.
Dissert. Abstr.

N75-27920 Missouri Univ., Rolla.
AUGER SATELLITES OF THE L23 AUGER EMISSION BANDS OF Al, Si, AND P Ph.D. Thesis
John Junior Melles 1973 80 p
Avail: Univ. Microfilms Order No. 75-15841

The satellites are interpreted as arising from double ionization of the L23 shell rather than from a plasmon gain process. The parent-satellite energy separations, delta E, between like structures were determined and were found to be consistently smaller than the volume plasmon energies measured for the same samples. A comparison of Si and SiO revealed no evidence that delta E for Si is dependent on the volume plasmon energy of the sample. The satellite threshold excitation energies, Et, were determined and were found to compare well with results expected for double ionization of the L23 level. The previously reported plasmon like loss structure associated with the L23 ionization loss peak for Si was found not to be related to the high energy

L23 Auger satellite. Also, an ionization loss peak for Si observed at a loss energy of 216 eV is tentatively identified as corresponding to double ionization of the L23 shell. Dissert. Abstr.

N75-27921 Brandeis Univ., Waltham, Mass.
HIGH ELECTRIC FIELD EXPERIMENTS ON GROUND STATE GALLIUM ATOMS AND AN ATTEMPT TO REDUCE THE UPPER LIMIT ON THE ELECTRIC DIPOLE MOMENT OF THE ELECTRON Ph.D. Thesis
Stanley Jay Rosenthal 1975 80 p
Avail: Univ. Microfilms Order No. 75-15123

An atomic beam magnetic resonance technique was used to measure the differential Stark splitting between flop-in Zeeman levels in the ground-state hyperfine structure of Ga69, and Ga71. Precision measurements of the shift were made at several electrical fields up to 200 ky/cm, and various rf power levels. The shift was determined, including systematic uncertainties in the electric field value and the filling factor. The theoretical and experimental results are compared and found to agree well. The results of an attempt to reduce the upper limit to the electric dipole moment of the electron is also presented. The method differs from earlier work in that heated glass electric field plates capable of sustaining 500 kv/cm were used. An instrumental effect involving the intrinsic time constant of heated glass electrodes was discovered.
Dissert. Abstr.

N75-27922 North Carolina Univ., Chapel Hill.
AN IONIC CONDUCTIVITY STUDY OF IMPURITY VACANCY ASSOCIATION IN SILVER CHLORIDE Ph.D. Thesis
John Peter Gerlach 1974 103 p
Avail: Univ. Microfilms Order No. 75-15638

Ionic conductivity data were taken for silver chloride specimens doped with various kinds (Ca, Mn, Ni, and Zn) and amounts (5 ppm - 300 ppm) of divalent cation impurities, over a temperature range of 20 degrees to 350 degrees Celsius. The data were computer fit by a nonlinear least squares algorithm to the Lidiard-Debye-Huckel model, resulting in values of the enthalpy and entropy of association between each type of divalent impurity and a silver vacancy. The association enthalpies for Ca, Mn, Ni, and Zn were found to be 0.34, 0.25, 0.24, and 0.61 electron volts, respectively. All values are considered reliable to + or - 0.01 electron volt with the exception of the value for the zinc-doped crystals, which is considered good only to + or - 0.06 electron volts; the smaller confidence due primarily to the low solubility of zinc in silver chloride. These values of association enthalpy compare favorably with results determined by EPR and diffusion experiments. Dissert. Abstr.

N75-27923 Missouri Univ., Rolla.
SURFACE ELASTIC WAVES IN PIEZOELECTRIC SEMICONDUCTORS AND LAYERED MEDIA Ph.D. Thesis
Yu-Pin Han 1974 150 p
Avail: Univ. Microfilms Order No. 75-15821

Generalized piezoelectric wave equations in piezoelectric semiconductors and layered media are derived. Systems considered are the piezoelectric semiconductor, the two layer piezoelectric insulator-semiconductor, the three layer piezoelectric insulator-gap-semiconductor, and the four layer piezoelectric insulator-gap-semiconductor-dielectric substrate. The eigenwave expansion and the iteration methods in the complex domain were used to solve the problems. Mathematically, it represents a solution of the eigenvalue boundary value problem which involves iteration of functions in the complex domain. Solutions obtained are eigenvalues and eigenvectors which include all the information from the wave equations and the boundary conditions. The numerical calculations were conducted for the above mentioned cases, with the conductivity, diffusitivity, carrier mobility, drift velocity, gap width, semiconductor layer width, permitivity of the dielectric substrate and frequency as the parameters.
Dissert. Abstr.

N75-27924 Maryland Univ., College Park.
THE EFFECTS OF NUCLEAR RADIATION ON LOW TEMPERATURE TRANSPORT PROPERTIES OF EPITAXIALLY GROWN GALLIUM ARSENIDE Ph.D. Thesis
Norman Jay Berg 1974 182 p
Avail: Univ. Microfilms Order No. 75-14298

The effects of Co-60 gamma-ray and high energy neutron displacement damage upon the low temperature transport properties of epitaxial gallium arsenide were investigated. These included impurity conduction, nonlinear transport, and low-field breakdown. The activation energy associated with the transition regime of the impurity conduction process was found to increase by a factor of 5 as a result of Co-60 gamma radiation, and only by a factor of 1.6 for a comparable neutron irradiation. The ratio of the Hall carrier density at low and high temperatures, decreased by a larger amount for Co-60 gamma irradiation than for neutron irradiation. The effects of neutron irradiation are explained in terms of increased compensation. For the case of Co-60 gamma irradiation, it is postulated that a new donar level is introduced which does not participate in the impurity conduction process. Dissert. Abstr.

N75-27925 Yale Univ., New Haven, Conn.
THE ANGULAR MOMENTUM DEPENDENCE OF THE DISTRIBUTION OF SHELL MODEL EIGENENERGIES Ph.D. Thesis
Ming-Ming King Yen 1974 209 p
Avail: Univ. Microfilms Order No. 75-15402

A formula is derived to approximate the angular momentum projection dependence of any operator averaged in a shell model basis. This approximate formula, which is a truncated series in Hermite polynomials, proved very good numerically and justified analytically for large systems. Applying this formula to seven physical cases was found that the fixed angular momentum projection energy centroid, width, and higher central moments can be obtained accurately provided for even-even nuclei the even and odd angular momentum projections are treated separately. Using this information the energy distribution for fixed angular momentum projection can be constructed assuming normal behavior. The fixed angular momentum level densities are deduced and spectra are extracted. Results are in reasonably good agreement with the exact values. Dissert. Abstr.

N75-27926 Pennsylvania Univ., Philadelphia.
A GREEN'S FUNCTION THEORY OF ELECTRONIC PROPERTIES AT SOLID SURFACES Ph.D. Thesis
David Kalkstein 1974 166 p
Avail: Univ. Microfilms Order No. 75-14577

A Green's function formalism was used to study the electronic properties at solid surfaces. It was applied to a single S-band simple cubic solid, and it was found that surface localized states can arise due to perturbations in the intra-atomic Coulomb integrals of surface atoms. For a (111) surface orientation, the number of surface states per surface atom may vary from zero to one, depending on the strength of the perturbation. A highly simplified model is introduced for the silicon (111) surface reconstruction into a (2 x 1) periodic structure. The single band of surface states obtained for the ideal surface configuration is split into two bands by the reconstruction. Dissert. Abstr.

N75-27927 Illinois Univ., Urbana.
THE EFFECT OF IMPURITIES ON THE CRYSTAL GROWTH OF LEAD TETRABORATE FROM ITS MELT Ph.D. Thesis
Ananda Hosakere Spinivasan Kumar 1974 166 p
Avail: Univ. Microfilms Order No. 75-11559

The growth kinetics could be satisfactorily represented in terms of the Turnbull and Cohen equation incorporating the expression for the site factor by a screw dislocation mechanism. Microscopic features, such as growth spirals and pyramids, also confirm the screw dislocation mechanism. Two growth regimes, characterized by different values for the enthalpy of activation for the interface transport process, were found to be present. It was suggested that this was due to a structural change in the melt at an undercooling of about 100 C. The enthalpies of activation for the interface transport process in the two growth regimes were found to resemble more closely the corresponding values for electrical conduction rather than for viscous flow.
Dissert. Abstr.

N75-27928# Technische Hogeschool, Eindhoven (Netherlands).
OPTICAL PROPERTIES OF DONOR-ACCEPTOR PAIRS AND BOUND EXCITONS IN GaP
Adrianus Teunis Vink 3 Sep. 1974 208 p refs
Avail: NTIS HC $7.25

The results of detailed low temperature luminescence studies

on GaP are presented. The specific areas under investigation included: (1) the cooperation of lattice vibrations (phonons) in radiative transitions, (2) some aspects of the recombination kinetics of isoelectronic center and donor-acceptor pairs, and (3) an experimental evaluation of the validity of the expressions in use for photon energy and transition probability. The results of a search for spectra related to the common donor Si (Ga) and common acceptors such as C (P), Zn (Ga), and Cd (Ga) are also discussed. Author

N75-27929# Amsterdam Univ. (Netherlands).
INFLUENCE OF ROTATIONAL INELASTIC COLLISIONS ON DIFFUSION Ph.D. Thesis
Ahmed Sadik Mohamed Wahby 18 Sep. 1974 66 p refs
Avail: NTIS HC $4.25

A description is given of the apparatus used along with experimental procedures. The diffusion coefficients calculated from runs at different temperatures were related to the diffusion coefficients at room temperature. Analyses were carried out as differential measurements with the mass spectrometer; the results are given on the temperature dependence of the diffusion for mixtures of H2, D2, and HD and mixtures of these gases with He. The relation between thermal diffusion and the temperature dependence of the diffusion coefficient was verified for helium-hydrogen and isotopic hydrogen mixtures. Measurements are presented on the temperature dependence of the diffusion coefficients for almost Lorentzian gas mixtures: H2, D2, and HD in argon and krypton. Results are presented of a study of the temperature dependence of the diffusion coefficients for NO with the noble gases He, Ne, Ar, and Kr. M.J.S.

N75-27930# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
RADIATION EFFECT ON GaAs INTERFACE
Rainer Zuleeg and Kurt Lehovec Sep. 1974 21 p refs
(Contract F19628-74-C-0129; AF Proj. 6096)
(AD-A004151; SR-1; AFCRL-TR-74-0495) Avail: NTIS CSCL 09/1

The C-V and Q-V technique was applied to the study of interface charge distributions of GaAs epitaxial layers grown on semi-insulating substrates. Changes of mobility and free carrier concentration in the epitaxial layer and extending through the interface into the substrate were determined before and after exposure to a neutrons fluence of 1.6 x 10 to the 15th power n/sq cm and a total dose of ionizing radiation of 10 to the 8th power rad (gaAs). Changes at the interface and in the expitaxial layer are correlated with the voltage-current characteristic variations of the GaAs junction field-effect transistors. Effects of neutron irradiation on the transient response to ionizing radiation of discrete junction field-effect transistors was assessed. GRA

N75-27931# Monsanto Co., St. Louis, Mo. Electronics Div.
THIN FILM OPTICAL WAVEGUIDES IN 3-V SEMICONDUCTORS Semiannual Technical Report, 1 Jul. - 31 Dec. 1973
M. George Craford Jan. 1974 34 p refs
(Contract F19628-72-C-0324; ARPA Order 2074)
(AD-A004143; AFCRL-TR-74-0356; SATR-3) Avail: NTIS

The development of techniques for the growth of vapor phase epitaxial GaAs/GaAsP waveguide structures, and GaAs/GaAlAs structures in which the GaAs layer is grown by vapor phase epitaxy on a GaAlAs liquid phase epitaxial substrate are described. Large area GaAs/GaAsP structures with good surface quality have been achieved, but wafer bow problems due to lattice mismatch have prevented the accurate measurement of attenuation rates. Two dimensional waveguides have been fabricated which have attenuation rates comparable to one dimensional waveguides. This result suggests that it should be possible to fabricate a two dimensional electro-optic modulator with a relatively low drive power. GRA

N75-27932# Eidgenossische Technische Hochschule, Zurich (Switzerland).
CONTRIBUTION TO THE THEORY AND IMPLEMENTATION OF A MAGNETIC COOLING CYCLE WITH NEW THERMAL SWITCHES Ph.D. Thesis [BEITRAG ZU THEORIE UND VERWIRKLICHUNG EINES MAGNETISCHEN KAELTE-KREISLAUFES MIT NEUEN WAERMESCHALTERN]
Hans Quack 1974 136 p refs In GERMAN
(Rept-4996) Avail: NTIS HC $5.75

Periodic demagnetization of paramagnetic materials with additional use of thermal switches provide ideal cooling cycles for cryostats. Studies on a helium thermosiphon and a cadmium wire switch whose heat conductivity depends on the magnetic field, show that the thermosiphon provides good cooling at an environmental temperature of 4.2 K. The cadmium switch produces a switching ratio of 15 at 4.2 K; substitution of a polycrystalline wire with a single crystal wire improves switching ratio.

N75-27933# Technische Hochschule, Darmstadt (West Germany).
ZEEMAN EFFECT AND SATELLITE CARRIER STRUCTURE IN ABSORPTION SPECTRA OF PURE AND DOPED PRASEODYMIUM AND EUROPIUM DOUBLE NITRATES Ph.D. Thesis [ZEEMANEFFEKT UND SATELLITENSTRUKTUR IM ABSORPTIONSSPEKTRUM VON REINEN UND DOTIERTEN Pr- UND Eu-DOPPELNITRATEN]
Attila Eren 27 Jan. 1975 111 p refs In GERMAN
Avail: NTIS HC $5.25

Absorption spectra of the mixed crystals Pr2Mg3(1-c)Co3C-(N03)12x24H20 exhibited secondary lines from impurity ion spins. PrZn(Co)-DN-, Pr(Eu)Mg-DN, and Pr(Bi)Mg-DN-crystals showed only minor crystal field defects. Zeeman spectra for the transformations of 7Fo yields a,b, 5D1; a,b,a 5D2 in single EuMg-DN crystals were obtained; magnetic dipole radiation was found in the 7Fo yields 5Do transfer, and temperature- and additive-dependent oscillator strength changes were observed in the transfers 7Fo yields 5Do; a,b 5D1; a,b,c 5D2.
Transl. by G.G.

N75-27934# Eidgenossische Technische Hochschule, Zurich (Switzerland).
POSITRON ANNIHILATION IN LATTICE DEFECTS OF POTASSIUM CHLORIDE Ph.D. Thesis [POSITRONENANNIHILATION IN GITTERDEFEKTEN IN KCl]
Dierk Herlach 1973 39 p refs In GERMAN; ENGLISH summary
(Diss-4970) Avail: NTIS HC $3.75

The angular correlation between annihilation quanta of positrons annihilating in pure and additively colored potassium chloride single crystals was measured up to color center concentrations of 6.1 x 10 to the 18th power/cu cm. A narrow component with 5.3 mrad FWHM was found in the correlation curves of samples containing more than approximately 10 to the 17th power F-centers/cu cm. It is shown that F- and M-centers are responsible for the occurrence of the narrow component. The shape and intensity of the latter can easily be calculated from the assumption that positrons are captured by F-center electrons forming localized positronium-like states at the negative ion vacancies. Least squares fits of this model to the experimental data yield a localization length of 5.48 + or - 0.05 A and a capture cross section of order 10 to the minus 15 power/sq cm. This supports the hypothesis of positronium formation. The enhancement of the narrow component due to magnetic mixing of the m = 0 eigenstates of singlet and triplet positronium was measured in external fields up to 25 kGauss with the field parallel and antiparallel to the polarization of the positrons, respectively. The observed effect confirms the existence of a positronium-like state and yields information about the probability density of the positron at the electron, the pick-off annihilation rate, and the degree of polarization of the positrons emitted by the Na-22 source. Author

N75-27935# Helsinki Univ. of Technology, Otaniemi (Finland). Dept. of Technical Physics.
EXPERIMENTAL STUDIES OF NUCLEAR PROPERTIES IN SOLIDS BELOW 50 mK Ph.D. Thesis
M. P. Berglund 1974 13 p refs
Avail: NTIS HC $3.25

Summaries are presented of papers on the subject of nuclear magnetic resonance and nuclear orientation thermometers. Topics discussed include nuclear refrigeration of copper, the construction and use of a pulsed nuclear magnetic resonance thermometer, the design and use of nuclear orientation thermometers employing Mn-54 and Co-60 nuclei in ferromagnetic hosts, nuclear spin-lattice relaxation of the Zeeman and the spin-spin systems

in copper between 1 and 17 mK, and improved thermal contact at ultralow temperatures between He-3 and metals containing magnetic impurities. M.J.S.

N75-27936# Eidgenossische Technische Hochschule, Zurich (Switzerland).
STRESS AND VOLUME EFFECTS ON CUBIC AND AXIAL SUPERCONDUCTORS Ph.D. Thesis
Hans Rudolf Ott 1974 91 p refs
(DISS-5077) Avail: NTIS HC $4.75

On single crystals of cubic (lead and aluminum) and axial (indium, tin, zinc, and gallium) metals, the length changes were measured at the magnetic field induced transition from the superconducting to the normal state between 0.3 K and the appropriate critical temperature T sub C. The measurements were made with a capacitive dilatometer, and it was possible to detect relative length changes of the order of 2 x 10 to the minus 10th power. By measuring length changes on crystals with different orientations it was possible to obtain information on the anisotropy of the pressure dependence of the superconducting parameters. For indium, zinc and gallium different signs were observed for the length changes in different directions. From an approximation of the BCS theory which is also valid in the strong coupling region, it follows that the similarity principle may be violated for strong and medium coupled superconductors. For lead, direct experimental evidence was found for this behavior, while for indium and tin the effect is too small to be seen in the experiment. Author

N75-27937# Technische Universitaet, Hanover (West Germany).
RESEARCH ON HYPERFINE STRUCTURE IN TECHNETIUM 1: SPECTRUM AND SPECIFICATION OF NUCLEAR QUADRUPOLE MOMENTS OF Tc(99) Ph.D. Thesis [UNTERSUCHUNG DER HYPERFEINSTRUKTUR IM TECHNETIUM 1: SPEKTRUM UND BESTIMMUNG DES KERNQUADRUPOLMOMENTES VON Tc(99)]
Dirk Wendlandt 1974 73 p refs In GERMAN
Avail: NTIS HC $4.25

Fabry-Perot spectrometer measurements on the ground level splitting of Tc I followed by numerical profile analysis developed a splitting factor A (a 6S5/2) = -3.64 (3) mK. This factor is interpreted as core polarization effect. Quantitative calculation using the spin polarization Hartree-Focke method showed good agreement with experimental and theoretical results. Further splitting studies on the terms 4d5 5s5p and 4d6 5p produced electron radial parameters for the configurations 4d5 5s5p and 4d6 5p that exhibited also the effects of core polarization in Tc-99. Transl. by G.G.

N75-27938# Technische Universitaet, Hanover (West Germany).
ORDERING PROCESSES IN ADSORPTION PHASES Ph.D. Thesis [ORDNUNGSVORGAENGE IN ADSORPTIONSPHASEN]
Mathilde Plancher 1974 136 p refs In GERMAN
Avail: NTIS HC $5.75

The potential model is used for the computerized simulation of sequential adsorption phases in localized chromatographic adsorption processes. Equilibrium phase and exchange effects in the adsorbing particle system are determined by kinematic approximation of the LEED bending diagram and the intensity dependence on temperature is found by variation of the exchange effect energy. Also calculated are ordering parameters, and configuration-energy and -entropy for surfaces of a cubic crystal lattice having four near neighbors per particle. Transl. by G.G.

N75-27939# Technische Universitaet, Brunswick (West Germany).
NON-LINEAR CHARACTERISTICS OF SMALL PROBES IN HOMOGENEOUS SUPERCONDUCTING CONDITIONS (RESEARCH ON THE APPLICATIONS FOR PARAMETRIC MICROWAVE STRENGTH) Ph.D. Thesis [NICHTLINEARE EIGENSCHAFTEN KLEINER PROBEN IM HOMOGENEN SUPRALEITUNGSZUSTAND (UNTERSUCHUNG UEBER DIE ANDWENDBARKEIT FUER PARAMETISCHE MIKROWELLENVERSTAERKER]
Rolf-Ruediger Huss 18 Apr. 1973 57 p refs In GERMAN
Avail: NTIS HC $4.25

The nonlinearity of homogeneous superconductivity which exists in superconducting bulk material and in thin films without magnetic field components normal to the film surface was investigated using the Ginzburg-Landau theory. A comparison of the surface-inductivity shows a stronger nonlinearity for current-fed thin films than for bulk material. Below the characteristic frequencies at which relaxation may occur and at a sufficient distance from the critical point, the ac properties are discussed in terms of the time-independent phenomenological theory; nonlinearity was used for parametric amplification in a configuration consisting of two resonators separated by a superconducting film. The pump power necessary for self excitation is small compared to a value whose intensity peaks reach the critical point even without any bias. By the application of a dc current the properties of the amplifier can be improved. Author

N75-27940# Eidgenossische Technische Hochschule, Zurich (Switzerland).
WEAKENED PARAELECTRICITY AT VERY LOW TEMPERATURES Ph.D. Thesis [VERDUENTE PARAELEKTRIKA BEI SEHR TIEFEN TEMPERATUREN]
Karl Knop 1974 72 p refs In GERMAN; ENGLISH summary
(Rept-5054) Avail: NTIS HC $4.25

The paraelectric behavior of hydroxyl-dipoles on anion lattice sites in NaCl, KCl, KBr and RbCl was studied by measuring the complex dielectric constant (1.4 cps to 100 kcps) at temperatures down to 0.025 K. The dipolar axis has equilibrium orientations along the six (001)-directions of the crystal. Under application of two-dimensional stress in the (001)-plane, the dipole prefers at low temperatures two orientations, and can be described by a double-well rather than a six-well system. Only samples with low concentrations of dipoles are considered. Measurements in a quasistatic electric field allow the determination of the electric dipole moment and the tunneling-splitting of the lowest energy levels. Crystal imperfections (vacancies, impurities, dislocations) generate random internal fields which lead to interaction energies with the dipole. Author

N75-27941# National Bureau of Standards, Boulder, Colo. Cryogenics Div.
MATERIALS RESEARCH IN SUPPORT OF SUPERCONDUCTING MACHINERY, 2 Semiannual Technical Report, 1 Mar. - 1 Sep. 1974
Alan F. Clark, Richard P. Reed, and Edward C. VanReuth Oct. 1974 797 p refs
(ARPA Order 2569)
(AD-A004586; SATR-2) Avail: NTIS

The second semi-annual technical reports are collected from six subcontractors on an ARPA sponsored program on the very low temperature properties of structural materials in support of superconducting machinery. The program is outlined and research progress is reported. Low temperature data are presented for the elastic, tensile, fatigue, and fracture properties, thermal expansion, specific heat, thermal and magnetothermal conductivity, electrical and magnetic properties of structural alloys. Effects of processing, and fabrication are also reported for many of the properties; weld and braze joint properties are included. Low temperature properties for composites are reviewed and limited tensile and flexure data at 4K presented. GRA

N75-27942# Johns Hopkins Univ., Baltimore, Md. Dept. of Chemistry.
THEORETICAL CONSIDERATIONS OF POTENTIAL ENERGY SURFACES FOR ION-MOLECULE REACTIONS
Joyce J. Kaufman Aug. 1974 33 p refs
(Contract F44620-69-C-0110; AF Proj. 9750)
(AD-A003687; AFOSR-74-1895TR) Avail: NTIS CSCL 07/4

A general formulation for potential energy surfaces for ion-molecule reactions is presented in terms of the symmetry and spin restrictions for permitted intermediates from reactants and for what electronic states of the products such intermediates can dissociate to. Large scale ab-initio configuration interaction calculations of the O(+) - N2 to NO(+) - N reaction convincingly confirmed the mechanism postulated on the basis of the symmetry and spin restrictions. This treatment was generalized successfully to the case of molecular decompositions and confirmed calculationally. Further examples of ab-initio configuration interaction calculations are presented for the C(+)

- H2 system and for the excited states of H3O(+). The symmetry and spin formulation of potential energy surfaces is completely general and applicable to all reactive and non-reactive collisions including electronically or vibrationally excited chemical lasers, atmospheric phenomena, hot atom chemistry and chemical kinetics. GRA

N75-27943# Massachusetts Inst. of Tech., Cambridge. Center for Materials Science and Engineering.
RESEARCH IN MATERIALS SCIENCE Semiannual Technical Report, 1 Jul. - 31 Dec. 1974
D. Epstein, R. M. Rose, M. MacVicar, and R. Lagow 31 Dec. 1974 228 p refs
(Contract DAHC15-73-C-0316)
(AD-A004647; SATR-3) Avail: NTIS CSCL 20/6

This report presents the Results and status of work after the third six month period of this program which consists of three separate tasks including the following: Optoelectronic materials and components; Minilaser development, diode pumps, KTN modulator program, coupling from laser to wave guide, feed materials for crystal growth; Superconducting Transition metal alloys; Development of surfaces and tunneling barriers for Al5 substrates; Chemical synthesis using high temperature lithium vapor species. Initiation of program involving the Synthesis of polymers and diamond-like materials; problem of purification and separation of the novel polylithium compounds. GRA

N75-27944# Polytechnic Inst. of Brooklyn, N.Y. Dept. of Physics.
IMPROVED CALCULATIONS OF X-RAY COHERENT AND INCOHERENT SCATTERING CROSS-SECTIONS Semiannual Progress Report, Mar. - Sep. 1974
Lawrence B. Mendelsohn Sep. 1974 17 p refs
(Contract N00014-67-A-0438-0011)
(AD-A004220) Avail: NTIS CSCL 07/4

Progress has been made in many areas of last year's proposal. Relativistic Hartree-Fock Impulse Compton profiles have now been calculated for all atoms up to numer 102. The Exact Hydrogenic L-shell method has been shown to give very accurate results, as compared with experiment, in the region of the profile center for scattering from neon and aluminum. Choices of atomic screening factors Z*(O), which are different from the widely used Slater's screening factors, have been shown for the 1s, 2p and 3d orbitals to give the most accurate one-electron expectation value results of all the hydrogenic screening factors considered. The Excited State Compton Profile Method has been debugged and the partial wave analysis has been shown to give agreement with a known result, for scattering from the 2s and 2p of neon, to about three significant figures. Finally, a direct variational expectation value principle has been employed to determine the Compton profile of a model system. GRA

N75-27945# Pennsylvania State Univ., University Park. Dept. of Materials Science.
DIFFUSION STUDIES IN NONMETALLIC SYSTEM. PART 2: DIFFUSION OF 51 Cr IN MgO AND Cr-DOPED MgO Final Report, 1 May 1970 - 30 Apr. 1974
V. S. Stubican, W. R. Bitler, and G. Weber 16 Dec. 1974 151 p refs
(Contract N00014-67-A-0385-0011; NR Proj. 032-525)
(AD-A004204) Avail: NTIS CSCL 20/12

The diffusion coefficient of 51Cr as a function of temperature for arc grown vapor deposited MgO-crystals with aliovalent impurity levels of 250 ppm can be expressed in equation form. The value of the activation energy for diffusion was found to be close to the interdiffusion activation energy in the system MgO-Cr2O3. Single crystals of Cr-doped MgO with Cr2O3 concentrations up to 0.348 mole % were grown by an arc fusion technique. Crystal size was approximate 3 x 3 x 5 mm. Diffusion coefficients of 51Cr in Cr-doped MgO indicated a linear increase with increased mole % of Cr2O3 to 0.348 mole %. GRA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N75-27946 British Library Lending Div., Boston Spa (England).
ON THE USE OF PNEUMOMETRIC PROBES TO MEASURE THE PARAMETERS OF WET VAPOUR
L. M. Zysina-Molozhen, I. N. Soskova, and V. B. Mitenkov Nov. 1974 7 p refs Transl. into ENGLISH from Energomashinostroenie (Moscow), v. 1, 1974 p 43-44
(BLL-RTS-9311) Avail: British Library Lending Div., Boston Soa, Engl.: £1.20; 2 BLL photocopy coupons

Pneumometric methods used to study the effects of supersonic wet vapor flow on total pressure tubes and static pressure probe measurements are discussed. Measuring errors and probe design are included. E.H.W.

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N75-27947 Yale Univ., New Haven, Conn.
A MULTIPERSON THEORY OF ORGANIZATIONAL DECISION-MAKING Ph.D. Thesis
Carl Albert Roth 1974 488 p
Avail: Univ. Microfilms Order No. 75-15354

While much attention has been directed toward the behavior of individual decision makers in risk bearing situations, there has been limited formal research on the behavior of organizations of individuals in similar environments. In this research, they identify and examine issues relevant to defining a theory of organizational decision making. The rules that are defined allow the organization to arrive at a single investment strategy by delegating the decision-making authority among its members. Consequently, the actual investment decision is dependent upon the risk attitudes of the members of the organization as well as the authority that each member has to influence the decision. Dissert. Abstr.

N75-27948 Arizona State Univ., Tempe.
A DECISION THEORY APPROACH TO PERSONNEL MANAGEMENT Ph.D. Thesis
John Butler Tillman 1975 287 p
Avail: Univ. Microfilms Order No. 75-15955

The application of decision theory models to personnel management decision situations is investigated. It includes a taxonomy of personnel management decision situations. It identifies and describes decision theory models which might be applied to personnel management decision situations. A systematic method of analysis which can be used as a guide by the personnel manager in the application of decision theory methods to practical personnel management problems is developed. The personnel management decision algebra is introduced as an aid to the decision-maker in the prediction and evaluation of outcomes which arise in his analysis of personnel management problems. Application of the personnel management decision algebra is an integral part of the method of analysis. Finally, the systematic method of analysis is applied to several personnel

management decision situations. It is found that the method of analysis provides an effective guide to the logical analysis of these personnel management decision problems. Dissert. Abstr.

N75-27949*# Scientific Translation Service, Santa Barbara, Calif.
ORGANIZING CENTRALIZED AIRCRAFT COMPONENT OVERHAUL
S. N. Malkov Washington NASA Jul. 1975 235 p refs Transl. into ENGLISH from the book "Organizatsiya Tsentralizovannogo Remonta Agregatov Samoletov" Moscow, Transport Press, 1974 p 1-180
(Contract NASw-2483)
(NASA-TT-F-16266) Avail: NTIS HC $7.50 CSCL 05A

Preparation of a stable production base and rational organization of centralized component overhaul processes are examined. Methods are presented for determining overhaul requirements, optimizing centralized production objects and locations, planning the production program, introducing standardized technology, and fully mechanized flow lines for group overhaul of aircraft components. Author

N75-27950# Office of the Director of Defense Research and Engineering, Washington, D.C.
THE INDEPENDENT RESEARCH AND DEVELOPMENT PROGRAM. A REVIEW OF IR AND D
Jun. 1974 44 p
(AD-A004610) Avail: NTIS CSCL 15/3

Contents: What is IR and D; What are the objectives; What are the benefits; How are the mechanisms for IR and D cost recovery applied; How is IR and D managed by contractors; What are the important aspects of governmental controls over IR and D; What are the key criticisms of DoDs IR and D program and how valid are they; Appendix - results of industrial survey. GRA

N75-27951# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SCIENCE MANAGEMENT
G. M. Dobrov 26 Nov. 1974 396 p refs Transl. into ENGLISH of the book "Upravlinnya Naukoyu" USSR, 1971 p 1-28
(AD-A004346; FTD-HC-23-896-74) Avail: NTIS CSCL 05/1

The book presents a general survey of science management both in the U.S.S.R. and abroad. The problems of scientific research management within the limits of a research team laboratory, institute department, and the national economy as a whole are considered. Existing management methods, the level of organization and cooperation in scientific work, and the adoption of methods of operations research in proposing research plans of the research institutes are analyzed. Problems of providing science management with prognosis and publishing activity control, systems of indices of scientific results and also the basic principles of regional policy in science are presented. GRA

N75-27952# RAND Corp., Santa Monica, Calif.
THE RELATIONSHIP BETWEEN SCIENCE AND THE MILITARY IN THE SOVIET UNION
Simon Kassel Jul. 1974 61 p refs
(Contracts DAHC15-73-C-0181; DAHC15-72-C-0083; ARPA Order 189-1)
(AD-A004613; R-1457-DDRE/ARPA) Avail: NTIS CSCL 05/1

The report analyzes open Soviet basic and applied science research for its possible contribution to development of military technology. As the national planner and evaluator of research and manager of the science and technology information service, the State Committee for Science and Technology cannot be entirely divorced from the early stages of military RDT and E. The research projects of the Academy of Sciences, USSR, include many whose exact American equivalents are either performed or funded by DOD agencies. Ten specific examples are analyzed. There seems no need for such research to be duplicated in secret military facilities, as some believe. Censorship cannot be the only reason why basic research articles so far exceed engineering development reports in number and sophistication, since this is equally true of the technology of automobiles, TV, and cameras. The Soviets are frankly anxious to publish scientific research to maintain international prestige and give their major researchers entree into meetings and conferences where useful information can be gained. GRA

N75-27953# Patent and Trademark Office, Washington, D.C.
A REVIEW OF PATENT OWNERSHIP
Jan. 1975 140 p
(COM-75-10050; PAT-036.3-7510) Avail: NTIS HC $5.75 CSCL 05B

Patent activity data are presented in terms of corporations and government agencies which own patents. The organizations are listed in nine industry groupings with government agencies grouped and listed separately. Following the listings are tables for each of these industry groupings which show, for the companies within the grouping, the distribution of patenting activity among the broad technological categories represented by the classes of the U.S. Patent Classification System. Patent ownership is reviewed in the technological areas of nuclear energy, coal gasification, and oil shale. M.J.S.

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N75-27954 Texas A&M Univ., College Station.
STATISTICAL PROCEDURES FOR REDUCING THE AMOUNT OF TECHNICAL DATA THAT MUST BE COLLECTED AND STORED DURING THE ANALYSIS OF A PHYSICAL SYSTEM Ph.D. Thesis
Ronald Clair Higgins 1974 167 p
Avail: Univ. Microfilms Order No. 75-15030

Statistical procedures that will enable a scientific experimenter to reduce the amount of technical data that he must collect and store are presented. The procedures are designed to identify duplicate information contained within a set of data. A computer model is used and it is necessary that the data under consideration be of the form of a function plus an error term, and that the observations be equally spaced. It is shown that once these assumptions have been accepted the model is easily applied. Examples are presented to help clarify the operation of the model. A listing of the computerized model is also provided. Dissert. Abstr.

N75-27955 Pennsylvania Univ., Philadelphia.
PARTITION ANALYSIS OF CATEGORICAL DATA Ph.D. Thesis
Richard Andrew Bartlett 1974 265 p
Avail: Univ. Microfilms Order No. 75-14536

For data-analysis population problems with large sample sizes, a class of statistical techniques called Partition Analysis was developed. The technique partitions the population into subpopulations, and by using independent estimates in these subpopulations, more accurate predictions for the whole population can be made. An identifying characteristic of a partition analysis is a diagnostic key which shows the most important predictor variables and their interactions as well as providing the mechanism for classifications in future populations where the criterion variable is absent. Several difficulties can arise in application of existing partition analysis approaches to problems with categorical criterion and predictor variables. A technique, Categorical Partition Analysis, is described which overcomes these difficulties. Dissert. Abstr.

N75-27956# Dayton Univ. Research Inst., Ohio.
THE IMPACT OF THE IMPLEMENTATION OF AN ON-LINE LITERATURE SEARCHING PROGRAM IN A RESEARCH LABORATORY ENVIRONMENT Final Report, 1 Dec. 1972 - 30 Jun. 1974
Jacqueline F. March and Frederic L. Scheffler Aug. 1974 74 p refs
(Contract F33615-71-C-1069; AF Proj. 7381)
(AD-A004301; UDRI-TR-74-42; AFML-TR-74-212) Avail: NTIS CSCL 05/2

The work described in this report covers two aspects: the general operations and nature of the Materials Documentation Center (MDC) of the Air Force Materials Laboratory (AFML) and the impact of introducing an on-line literature searching capability on the behavior of professional personnel within the Air Force Materials Laboratory. A brief description of the Materials Documentation Center is given followed by considerations leading to the decision to provide on-line literature searching services to personnel in the Air Force Materials Laboratory. GRA

N75-27957# Ohio State Univ., Columbus. Computer and Information Science Research Center.
A MODEL FOR DATA SECURE SYSTEMS. PART 3: A DEADLOCK BASED PROTECTION MECHANISM
David K. Hsiao and Neal F. Kaffen 1 Nov. 1974 39 p refs
(Contract N00014-67-0232-0022)
(AD-A004676; OSU-CISRC-TR-74-8-Pt-3) Avail: NTIS CSCL 09/2

A theory of deadlock and its application to computer security is presented. The use of a real process to achieve security deadlocks in a protection mechanism is analyzed and found to be too restrictive. An alternative approach which uses pseudo processes is proposed. Security deadlocks are resulted from real process requests for denied access and from incipient deadlock situations created by the pseudo processes. A queue structure is used as the basic component of the deadlocking mechanism. A set of five basic functions, which manipulate the queues are described. Using only these five functions, deadlock security can be maintained in the queue structure. Furthermore, an example of deadlock security being incorporated into an existing system is described. Finally, additional benefits in using a deadlock-based mechanism such as dynamic auditing and charging security overhead only to violators are motivated. GRA

N75-27958# Center for Naval Analyses, Arlington, Va. Inst. for Naval Studies.
USERS GUIDE TO THE REPORT GENERATOR FOR THE NAVY RESOURCE MODEL
Joseph David Kinkade and Robert H. Simmons Aug. 1974 34 p refs
(Contract N00014-68-A-0091)
(AD-A004191; CRC-256) Avail: NTIS

This Report Generator is a highly generalized information-extracting and report-formatting computer routine. Through a sophisticated command language and system of dictionaries, it can report out information in countless formats and degrees of detail. The description of the Report Generator in this users guide is for the dictionaries and data files used in the Navy Resource Model (NARM) at CNA. However, it is possible for the reader to apply the Report Generator to his own management information system by creating his own dictionaries for his own data tapes. How to create dictionaries is described in this guide. GRA

N75-27959# Pennsylvania State Univ., University Park. Center for the Study of Science Policy.
SOURCES AND USES OF SCIENTIFIC AND TECHNICAL INFORMATION BY STATE LEGISLATURES
Irwin Feller, Michael King, Donald C. Menzel, Robert OConnor, and Peter Wissel May 1974 105 p
(Grant NSF GI-34868)
(PB-240689/0; NSF/RA/G-74-005) Avail: NTIS HC $5.25 CSCL 05B

Preliminary findings from a survey of a cross section of state legislatures on the relationship between science and technology and state legislative policymaking are summarized. Although the mode of operation in each legislature is so distinctive that no interstate generalizations can be made, the study did indicate that there is general dissatisfaction with the current quality of information, and that scientific and technological information is usually considered irrelevant by state legislators. Following the analysis of current practice in selected state legislatures, suggestions are made for strengthening the scientific and technical information capabilities of the state legislatures. GRA

N75-27960# Oklahoma State Univ., Stillwater. Cooperative Extension Service.
COOPERATIVE EXTENSION ENVIRONMENTAL TECHNOLOGY TRANSFER REPORT Final Report
J. O. Grantham Jan. 1974 99 p refs
(Grant NSF GT-39426)
(PB-240771/6; NSF/RA/G-74-007) Avail: NTIS HC $4.75 CSCL 05B

A preliminary feasibility study for transferring environmental technology information, via the cooperative extension service network in Oklahoma, to local government officials and other community leaders is reported. Surveys among some 2100 local leaders and influential citizens of Oklahoma indicated that they were concerned about environmental matters and wanted technical assistance to help cope with such problems. Major concern was expressed about land pollution from solid waste (especially roadside dumping), land erosion, and ecological balance. After survey analyses, a comprehensive plan was proposed whereby Cooperative Extension could serve as a transfer mechanism to supply the needed technology, in a form in which it could be utilized and accepted, to aid in the solution of such problems. GRA

N75-27961# Missouri Univ., Rolla.
CAPABILITY OF THE UNIVERSITY OF MISSOURI FOR PUBLIC TECHNOLOGY SERVICE Final Summary Report
Daniel L. Babcock and Daniel S. Eppelsheimer Oct. 1974 47 p refs
(Grant NSF GT-36391)
(PB-240767/4; NSF/RA/G-74-024) Avail: NTIS HC $3.75 CSCL 05B

An evaluation was made of current progress in public technology in one university system and the changes needed to improve public technology service were assessed. The vehicle for study was the University of Missouri, which consists of four campuses and a nationally known extension system. The research method consisted of questionnaires and interviews of department chairmen, deans, and extension personnel throughout the University. Specific concepts for improved public technology service are identified for each of the four campuses of the University of Missouri. Prerequisite conditions and an organization model for an effective public service delivery system are also identified. GRA

N75-27962# National Bureau of Standards, Washington, D.C.
DIMENSIONS/NBS, VOLUME 59, NUMBER 3, MARCH 1975 Monthly Technical News Bulletin
Mar. 1975 25 p
(COM-75-50141-03; NBS/DIM-59/3; LC-25-26527) Avail: NTIS MF $2.25; SOD HC $0.80 as C13.13:59/3 Also available from SOD on subscription $9.45/year domestic, $11.85/year foreign CSCL 05B

This monthly magazine features short summaries of major technical developments, highlights of work in progress, major speeches and statements by Bureau management, and a listing of NBS publications. The table of contents for the current issue is: The Law Enforcement Standards Laboratory; Safer streets through improved communication; Guidelines for keeping better court records; Helping improve police protection; Toward more objective evidence; Investigating the performance of security systems; Patrolcar performance and safety studied; Highlights; New flowchart template for Federal computer users; Call for papers issued for NBS/ANSI symposium; Proceedings of Fire Safety Research Symposium available; Metric kit published; New data on methane; Particle accelerator facilities upgraded. GRA

N75-27963# Pennsylvania State Univ., University Park. Technical Assistance Program.
PENNTAP'S TRANSFER OF TECHNOLOGY TO THE PUBLIC SECTOR Final Report, 1 Jul. 1972 - 30 Jun. 1974
H. Leroy Marlow and Edwin W. Biederman, Jr. Oct. 1974 73 p
(Grant NSF GT-35010)
(PB-240433/3; NSF/RA/G-74-026) Avail: NTIS HC $4.25 CSCL 05B

The Pennsylvania Technical Assistance Program (PENNTAP) conducted a two-year experiment to determine if PENNTAP's technology sharing approach for industry could be applied to local, regional and state government, fire companies, hospitals and educational institutions within the Commonwealth. Problem

requests received by PENNTAP from the public sector during the first year (fiscal 1973) totaled 361. During the second year the number of problem requests increased to 409 for a two-year total of 770 questions. More than 1,900 municipality-related contacts were made during the experiment. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N75-27964# National Center for Energy Management and Power, Philadelphia, Pa.
THE PROBLEM OF PEAK LOAD PRICING SUBJECT TO RATE OF RETURN CONSTRAINT
David L. McNicol Mar. 1974 49 p refs
(Grant NSF GI-29729)
(PB-239765; NSF/RA/N-74-152(10)) Avail: NTIS HC $3.75 CSCL 05C

It is shown that Wellisz's and Bailey's analyses of peak pricing subject to regulatory constraint imply the absence of overcapitalization. The error in their analyses is identified and it is established that it is optimal to use more than the cost minimizing quantity of capital, and if inputs are continuously variable, the optimal output exceeds the monopoly output in each period but only peak period output exceeds the monopoly level for a fixed coefficient technology. It is then shown that the type of price discrimination permitted affects the profitability of peak load pricing. Author

N75-27965# Ohio Dept. of Economic and Community Development, Columbus.
THE STATE DEVELOPMENT FOUNDATION: MEETING SOCIETAL NEEDS THROUGH CENTERS OF INNOVATION. VOLUME 1: PROJECT REPORT Final Report, 15 May 1972 - 15 Sep. 1974
D. D. Colosimo, Marcia Wilkof, and Jules J. Duga Mar. 1974 46 p refs
(Grant NSF GT-34578)
(PB-240792/2; NSF/RA/G-74-020A) Avail: NTIS HC $3.75; HC also available from NTIS HC $9.00/set of 2 reports as PB-240791-SET CSCL 05C

Some approaches were tried, based on the observation of a direct relationship between scientific research and economic development. State science foundations were created and funded to support projects to enhance the state's scientific research capabilities which would attract Federal R and D funds and associated high technology industries. The success rate of these foundations was mixed, but successful science foundations have attracted at least four new development dollars for each foundation dollar. This report examines and assesses the experiences of nine state science foundations and twelve private centers of innovation. Guidelines are suggested for a state development foundation. GRA

N75-27966# Ohio Dept. of Economic and Community Development, Columbus.
THE STATE DEVELOPMENT FOUNDATION: MEETING SOCIETAL NEEDS THROUGH CENTERS OF INNOVATION. VOLUME 2: APPENDICES Final Report, 15 May 1972 - 15 Sep. 1974
D. D. Colosimo, Marcia Milkof, and Jules J. Duga Mar. 1974 152 p refs
(Grant NSF GT-34578)
(PB-240793/0; NSF/RA/G-74-020B) Avail: NTIS HC $6.25; HC also available from NTIS HC $9.00/set of 2 reports as PB-240791-SET CSCL 05C

A comparative analysis of state technical development activities was conducted in order to provide a basis for improved economic development programs in Ohio and other states. This analysis of nine state foundations and twelve private centers of innovation is based on information derived from annual reports, published papers, personal and telephone interviews, and unpublished reports and correspondence. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N75-27967# Committee on Appropriations (U. S. Senate).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATION ACT, 1976
Washington GPO 25 Jun. 1975 44 p H.R. 8070 referred to the Comm. on Appropriations, 94th Congr., 1st Sess., 25 Jun. 1975
Avail: US Capitol, Senate Document Room

The 1976 Federal appropriations for the following programs and independent agencies are included: housing and rent supplement programs; community development and planning grants; flood insurance and disaster relief programs; American Battle Monuments Commission; Office of Consumer Affairs; National Aeronautics and Space Administration; National Mortgage Association. L.B.

N75-27968# Committee on Science and Technology (U. S. House).
NASA AUTHORIZATION, 1976, VOLUME 2, PART 4
Washington GPO 1975 1006 p refs Hearings on H.R. 2931 (superseded by H.R. 4700) before Subcomm. on Space Sci. and Applications of Comm. on Sci. and Technol., 94th Congr., 1st Sess., 25-27 Feb. 1975
(GPO-50-465) Avail: Subcomm. on Space Sci. and Applications CSCL 05D

Hearings on the NASA budget authorization legislation for fiscal year 1976 are presented. Testimony is given on applications programs in energy research and planning, manufacturing in zero gravity, and biomedical technology. Other programs discussed include: technology for unmanned spacecraft and payloads, tracking and data acquisition program, orbital transportation in the era of the space shuttle and beyond, and gravity dependent fluid physics, heat transfer, and combustion phenomena. Emphasis is placed on the employment of scientists and engineers in high technology industry and an increase in research and development expenditures in order to effectively utilize NASA aerospace technology. J.M.S.

N75-27969# Committee on Science and Technology (U. S. House).
NASA AUTHORIZATION, 1976, VOLUME 3
Washington GPO 1975 671 p refs Hearings on H.R. 2931 (superseded by H.R. 4700) before Subcomm. on Aviation and Transportation R and D of Comm. on Sci. and Technol., 94th Congr., 1st Sess., 5 and 18-20 Feb. 1975
(GPO-49-485) Avail: Subcomm. on Aviation and Transportation R and D

A survey of NASA research programs in aeronautics, with economic analyses, is presented. Topics considered are: (1) improved quiet-clean aircraft engines; (2) aviation safety (in-flight and landing); (3) aero fuel conservation technology; (4) military aircraft; (5) transport and cargo aircraft (civil aviation); and (6) supersonic and hypersonic aircraft. J.R.T.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N75-27970# Wisconsin Univ., Madison. Engineering Experiment Station.
INCREASED FUEL ECONOMY IN TRANSPORTATION SYSTEMS BY USE OF ENERGY MANAGEMENT. VOLUME 1: GENERAL RESULTS AND DISCUSSION Final Report

N. H. Beachley and A. A. Frank Dec. 1974 174 p refs
(Contract DOT-OS-30112)
(PB-240220/4; DOT-TST-75-2) Avail: NTIS HC $6.25 CSCL 21D

Computer simulation programs were developed, based on experimental data as well as theory, to simulate the performance of current motor vehicles over all types of driving cycles. The simulation includes the effect of the dynamic interactions among the powerplant and drivetrain components, and is quite sophisticated so as to accurately predict the performance changes produced by a wide range of vehicle modifications. Two versions were developed--a real-time hybrid computer simulation and an all-digital batch program. Simulation of vehicles with continuously variable transmissions as a replacement for the current automatic transmission shows that a considerable improvement in fuel mileage over present-day automobiles is possible. GRA

88 SPACE SCIENCES (GENERAL)

N75-27971*# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
[NASA SUPPORTED RESEARCH PROGRAMS] Final Report
Willard F. Libby 12 May 1975 34 p refs
(Grant NsG-237-62)
(NASA-CR-143105) Avail: NTIS HC $3.75 CSCL 05I

A summary of the scientific NASA grants and achievements accomplished by the University of California, Los Angles, is presented. The development of planetary and space sciences as a major curriculum of the University, and statistical data on graduate programs in aerospace sciences are discussed. An interdisciplinary approach to aerospace science education is emphasized. Various research programs and scientific publications that are a direct result of NASA grants are listed. J.R.T.

N75-27972# RAND Corp., Santa Monica, Calif.
THE STRUCTURE OF SOVIET OUTLAYS ON R AND D IN 1960 AND 1968
Nancy Nimitz Jun. 1974 133 p refs
(Contract DAHC15-72-C-0083)
(AD-A004598; R-1207-DDRE) Avail: NTIS CSCL 05/3

Whether the share of defense/space in total ruble outlays is taken to be three-quarters, as estimated elsewhere, or one-half, as this report estimates, does not alter R and D results but does change implied relative productivities in military and civilian R and D. Differences in sectoral productivity are explained largely by differences in the characteristics of the buyers of new civilian and military capital goods in the USSR. Unlike the civilian customer, the military customer has both market power and an evident preference for technical approaches that save time and restrain costs. The method of estimation links ruble outlays to R and D employment. Total employment and outlays are distributed among 28 branches of the economy (10 nonindustrial and 18 industrial); the contribution of each branch to defense/space is then estimated as a range (defined at the lower end by the percentage share of defense/space in R and D outlays in the analogous U.S. branch in the same year.) GRA

N75-27973*# Kanner (Leo) Associates, Redwood City, Calif.
SCIENCE IN SPACE STATIONS
O. Wolczek Washington NASA Jul. 1975 34 p Transl. into ENGLISH from Astronautyka (U.S.S.R.), v. 17, No. 6, 1974 p 8-18
(Contract NASw-2790)
(NASA-TT-F-16469) Avail: NTIS HC $3.75 CSCL 22A

The Salyut space station is briefly discussed. A great variety of tabulated data from the Skylab space station is presented, including station parameters, basic results, purpose of various instruments, technological experiments and medical and biological research data. The use of extraterrestrial space objects to obtain data in the fields of astronomy, physics, geophysics, industrial technology, medicine, and biology is discussed. Author

N75-27974# Naval Ordnance Lab., White Oak, Md.
INDEPENDENT RESEARCH 1974 Final Report
W. W. Scanlon 1 Sep. 1974 173 p refs
(AD-A004194; NOLR-1304) Avail: NTIS CSCL 05/2

The current status is given of active independent research tasks. These tasks fall in the areas of physics, chemistry, electro-chemistry, mathematics, metallurgy, explosives, aero and hydroballistics. GRA

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N75-27975 Pennsylvania Univ., Philadelphia.
TWO-DIMENSIONAL SPECTRAL ANALYSIS OF THE OPTICAL FEATURES OF NGC 1976 Ph.D. Thesis
Peter M. Perry 1974 125 p
Avail: Univ. Microfilms Order No. 75-14609

An analytical method is presented for extracting spatial information from digitized images of extended objects on astronomical plates by using two-dimensional spectral analysis. The fast Fourier transform (FFT) is used to obtain power spectra and a test, based on the Chi-squared distribution of a random variable, is used to determine the significance level in these spectra and automatically reject contributions falling below this level. The raw data, intermediate images, and power spectra are displayed via contour maps. For additional clarity the power spectra are also presented in perspective view. Power spectra of intensity image arrays give the observed energy distribution as a function of spatial frequency while spectral peaks are used to identify and quantify statistically preferred dimensions and orientations. Two regions in NGC 1976, selected for their clearly different structural appearance, were analyzed using this method. Dissert. Abstr.

N75-27976 Rochester Univ., N.Y.
THE DEVELOPMENT OF THE UBViyz PHOTOMETRIC SYSTEM AND ITS APPLICATION TO THE STUDY OF METAL ABUNDANCES IN GALACTIC G AND K GIANT STARS Ph.D. Thesis
Peter Anthony Jennens 1975 229 p
Avail: Univ. Microfilms Order No. 75-15207

A fast photometric system, employing six filters and a photomultiplier with S-20 cathode, was selected to study G and K giant stars. Measurements in the new system, were made for 260 nearby giant stars and for 180 giants in nineteen galactic clusters and one globular cluster. Results show that no obvious correlation of iron or hydrogen with either cluster age or location in the galactic disc is apparent. Dissert. Abstr.

N75-27977*# Joint Publications Research Service, Arlington, Va.
X-RAY ASTRONOMY
I. P. Tindo Washington NASA Jul. 1975 57 p Transl. into ENGLISH from Znaniye: Novoye v Zhizni, Nauke, Tekhnike (Moscow), no. 3, 1975 p 1-64
(NASA-TT-F-16377) Avail: NTIS HC $4.25 CSCL 03A

Scientific instruments which are launched in rockets and satellites for purposes of research in the X-ray astronomy field are described. A brief summary of the results obtained in recent years by studying the Sun, galactic and extragalactic discrete X-ray sources, and the X-ray background in space. Author

N75-27978*# Indiana Univ., Bloomington. Dept. of Astronomy.
TREATMENT OF ATOMIC AND MOLECULAR LINE BLANKETING BY OPACITY SAMPLING
Hollis R. Johnson and Brian M. Krupp [1975] 19 p refs
(Grants NGL-15-003-002; NSF MPS-74-18929)
(NASA-CR-143097) Avail: NTIS HC $3.25 CSCL 03A

An opacity sampling (OS) technique for treating the radiative opacity of large numbers of atomic and molecular lines in cool stellar atmospheres is presented. Tests were conducted and results show that the structure of atmospheric models is accurately fixed by the use of 1000 frequency points, and 500 frequency

points is often adequate. The effects of atomic and molecular lines are separately studied. A test model computed by using the OS method agrees very well with a model having identical atmospheric parameters computed by the giant line (opacity distribution function) method. Author

N75-27979*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
POLAR MOTION SPECTRA BASED UPON DOPPLER IPMS AND BIH DATA
Michael A. Graber Jun. 1975 15 p refs Submitted for publication
(NASA-TM-X-70924; X-921-75-157) Avail: NTIS HC $3.25 CSCL 03B

In comparing polar motion spectra, an oscillation was found at 1.3 cpy which might be due to an Eulerian motion of the solid inner core. An extended 15-year data set was filtered and analyzed to yield a Chandler peak with a period 430.8 solar days and a full width at half-maximum of 0.7 days (Q-600). The data was reanalyzed in overlapping 3-year segments and indicates that the excitation of the Chandler wobble is a discrete process and that periods as long as three years occur in which the driving mechanism is essentially quiescent. Author

N75-27980*# McDonald Observatory, Austin, Tex. Dept. of Astronomy.
LUNAR MOTION ANALYSIS Semiannual Status Report, 1 Jan. - 30 Jun. 1975
J. Derral Mulholland Jul. 1975 7 p refs
(Grant NGR-44-012-219)
(NASA-CR-143175) Avail: NTIS HC $3.25 CSCL 03A

The results of raw data tapes on lunar motion recorded at McDonald Observatory from January 1 through June 30, 1975 are presented. The direct use of laser pulse shape information in the filtering of return photon data is suggested, together with an extensive revision of the environment record. The absence of archive parameters, including clock epoch offset, atmospheric seeing, and shot-by-shot resolution is noted. Programming problems involving photoelectric occultation observations are also examined. L.B.

N75-27981*# Iowa Univ., Iowa City.
A DECAMETRIC WAVELENGTH RADIO TELESCOPE FOR INTERPLANETARY SCINTILLATION OBSERVATIONS
Willard M. Cronyn (NOAA, Boulder, Colorado) and Stanley D. Shawhan Mar. 1975 22 p refs
(Grant NGL-16-001-002)
(NASA-CR-143176; U-of-Iowa-75-12) Avail: NTIS HC $3.25 CSCL 03A

A phased array, electrically steerable radio telescope (with a total collecting area of 18 acres), constructed for the purpose of remotely sensing electron density irregularity structure in the solar wind, is presented. The radio telescope is able to locate, map, and track large scale features of the solar wind, such as streams and blast waves, by monitoring a large grid of natural radio sources subject to rapid intensity fluctuation (interplanetary scintillation) caused by the irregularity structure. Observations verify the performance of the array, the receiver, and the scintillation signal processing circuitry of the telescope. Author

N75-27982# Logicon, Inc., Torrance, Calif.
ANALYSIS AND PROGRAMMING FOR SCIENTIFIC RESEARCH Final Report, 1 Apr. 1971 - 31 Aug. 1974
James N. Bass, Krishin H. Bhavnani, ed., Martin G. Hurwitz, T. Shu, John L. Stancik, and Leo A. Whelan 30 Sep. 1974 146 p refs
(Contract F19628-71-C-0154)
(AD-A003693; AFCRL-TR-74-0480) Avail: NTIS CSCL 03/1

The report describes significant analyses and computer programming problems performed in support of Air Force Cambridge Research Laboratories scientists. Ephemerides systems, orbit determination systems, systems to investigate ionospheric and geomagnetic phenomena, atmospheric density studies, and analyses of satellite wire-boom dynamics have been covered in varying degrees of depth. GRA

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N75-27983 Rensselaer Polytechnic Inst., Troy, N.Y.
VERY BROADBAND STRUCTURE IN THE INTERSTELLAR EXTINCTION CURVE Ph.D. Thesis
Kenneth Henry Rex 1975 111 p
Avail: Univ. Microfilms Order No. 75-14947

The interstellar reddening curve was measured from 3860 A to 10,240 A for 16 stars with the KPNO scanning spectrometer. The existence of shallow very broadband structure (VBS) found in the data of J. B. Whiteoak was confirmed. Higher photometric accuracy and wavelength resolution than previously obtained have better defined the known VBS and have uncovered an additional absorption structure. This new structure is about 750 A wide and is centered at 1.59/microns (6290 A). The results are displayed in terms of residuals formed by subtracting a smooth theoretical curve from the observed data. A significant regional dependence of the VBS was also found. Dissert. Abstr.

N75-27984 Arizona Univ., Tucson.
GALAXY ANGULAR MOMENTUM Ph.D. Thesis
Laird Alan Thompson 1974 197 p
Avail: Univ. Microfilms Order No. 75-14212

In order to test the theories which purport to explain the origin of galaxy angular momentum, data for about 1000 individual galaxies in eight rich clusters are presented. The clusters which are studied include Virgo, A 119, A 400, A 1656(Coma), A 2147, A 2151(Hercules), A 2197, and A 2199. Selected samples of these data are used to investigate systematic alignment effects in clusters of galaxies and to investigate the intrinsic ellipticities of E, SO, and spiral galaxies. Six models of galaxy formation are reviewed, and the major emphasis is placed on how each model explains the origin of galaxy angular momentum. Of the six models it appears that the Peebles' model of tidal acceleration is the least consistent with the data. Two of the models are particularly successful in explaining all observations. These two models, one by Icke and the other by Sunyaev, Zeldovich and Doroskevich, are very similar and both start with a massive protocluster which later fragments into individual galaxies. The other models are less comprehensive and might be consistent with some aspects of the data. Dissert. Abstr.

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N75-27985 British Library Lending Div., Boston Spa (England).
MARS THROUGH GEOLOGISTS EYES
B. Konovalov [1974] 6 p Transl. into ENGLISH from Izvestia, (USSR), 20 Mar. 1974
(BLL-M-23500-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

Dimensions, density, and relief height of the Earth, Moon, and Mars are compared. It is concluded that there are two types of regions on Mars; highlands and depressions, differing in level of relief, in the thickness of the crust, and in chemical and mineralogical composition. Photographs from Mariner 9 and Mars 5 are discussed as revealing extensive Martian vulcanism, a wide ditch which may be of tectonic origin, and tributary-like networks or valleys. It is suggested that more perceptible manifestations of geological activity are to be expected on Mars than those discovered on the surface of the Moon. L.B.

N75-27986 Brown Univ., Providence, R.I.
FIVE STUDIES RELATED TO SEDIMENTARY PROCESSES ON MARS Ph.D. Thesis

Raymond Ernst Arvidson 1974 148 p
Avail: Univ. Microfilms Order No. 75-9121

A summary is given of sedimentary processes on Mars. Data cover: (1) extremely high atmospheric wind velocities for entraining particulate matter, (2) reconnaissance studies of sedimentary patterns around the Pinacat volcanic field and adjacent Sonora domes, (3) craters and associated aeolian features visible on Mariner 9 photographs, (4) analysis of computerized crater and aeolian features, and (5) morophologic classification and impact exposure ages of Martial craters in equatorial cratered terrain. Dissert. Abstr.

N75-27987*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ACCURACY OF ESTIMATING THE MASSES OF PHOBOS AND DEIMOS FROM MULTIPLE VIKING ORBITER ENCOUNTERS
Robert H. Tolson and Mary L. Mason Jul. 1975 22 p refs
(NASA-TM-X-72717) Avail: NTIS HC $3.25 CSCL 03B

The problem was investigated of estimating the masses of Phobos and Deimos from Doppler and onboard optical measurements during the Viking extended mission. A Kalman filter was used to analyze the effects of gravitational uncertainties and nongravitational accelerations. These accelerations destroy the dynamical integrity of the orbit, and multibatch or limited memory filtering is preferred to single batch processing. Optical tracking is essential to improve the relative orbit geometry. The masses can be determined to about 10% and 25% respectively for Phobos and Deimos, assuming satellite densities of about 3 gr/cu cm. Author

N75-27988*# Joint Publications Research Service, Arlington, Va.
PLANETARY MAGNETISM
Sh. Sh. Dolginov Washington NASA 15 Jun. 1975 62 p refs Transl. into ENGLISH from the book "Novoye v Zhizni, Nauke, Tekhnike, Seriya Kosmonavtika, Astronomiya, no. 12" Moscow, Znaniye Press, 1974 p 1-64
(NASA-TT-F-16379) Avail: NTIS HC $4.25 CSCL 03B

Various satellite observations associated with the problem of the origin and nature of planetary fields are examined. The effects of solar wind, bow shock, and geomagnetism are also discussed. Author

N75-27989*# Texas Univ., Austin. Dept. of Geological Sciences.
A STUDY OF IGNIMBRITES IN THE CORDILLERAN REGION AS A BASIS FOR INTERPRETATION OF LUNAR PLAINS Final Report, Jun. 1966 - May 1975
Stephen E. Clabaugh May 1975 10 p refs
(Grant NGL-44-012-045)
(NASA-CR-143141) Avail: NTIS HC $3.25 CSCL 03B

Progress in a study of lunar topography and geology by analyzing and mapping the earth's mantle is presented. Data from the study are used for the construction of a 600 page lunar topographic atlas. A list of research publications from the study is also included. J.R.T.

N75-27990*# Arizona Univ., Tucson. Dept. of Electrical Engineering.
DETECTION TECHNIQUES FOR TENUOUS PLANETARY ATMOSPHERES Semiannual Report, 1 Jan. - 30 Jun. 1975
Stuart A. Hoenig, Principal Investigator 30 Jun. 1975 49 p refs
(Grant NGL-30-002-019)
(NASA-CR-143098; SR-24) Avail: NTIS HC $3.75 CSCL 03B

Electrostatic charging of dust and its effect on planetary atmospheres is discussed, along with its applications to Martian atmosphere. Laboratory and field experiments in dust storms indicate that the major atmospheric parameters on Mars include: (1) pressure, temperature, and relative humidity; (2) wind velocity and direction; (3) particulate size and composition; and (4) electrostatic charge and field gradient. Various instrumentation techniques adapted for a Mars Lander are briefly reviewed. The effect of exoelectron emission on surface catalysis is studied. J.A.M.

N75-27991*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SOLID STATE CONVECTION MODELS OF LUNAR INTERNAL TEMPERATURE
Gerald Schubert, Richard E. Young (Calif. Univ., Los Angeles), and Patrick Cassen 15 May 1975 39 p refs
(Grant NGL-05-007-002)
(NASA-TM-X-72441) Avail: NTIS HC $3.75 CSCL 03B

Thermal models of the Moon were made which include cooling by subsolidus creep and consideration of the creep behavior of geologic material. Measurements from the Apollo program on seismic velocities, electrical conductivity of the Moon's interior, and heat flux at two locations were used in the calculations. Estimates of 1500 to 1600 K were calculated for the temperature, and one sextillion to ten sextillion sq cm/sec were calcualted for the viscosity of the deep lunar interior. Author

N75-27992*# Lowell Observatory, Flagstaff, Ariz.
THE 1973 DUST STORM ON MARS: MAPS FROM HOURLY PHOTOGRAPHS
Leonard J. Martin [1975] 34 p refs
(Grant NGR-03-003-001)
(NASA-CR-143110) Avail: NTIS HC $3.75 CSCL 03B

The hourly progress of the 1973 major Martian storm was mapped using photographic images from the International Planetary Patrol. Two series of 20 daily maps show the semi-hourly positions of the storm brightenings in red light and blue light. The maps indicate that the 1973 storm had many similarities to the 1971 storm. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N75-27993 British Library Lending Div., Boston Spa (England).
THE INTERPRETATION OF THE TOTAL MAGNETIC VECTOR MEASUREMENTS IN SUN SPOTS
V. A. Kotov Dec. 1974 20 p refs Transl. into ENGLISH from Izv. Krym. Astrofiz. Observ. (USSR), v. 46, 1972 p 115-127
(BLL-RTS-9152) Avail: British Library Lending Div., Boston Spa, Engl.: £3.80; 6 BLL photocopy coupons

A large change in the magnetic field with depth in the spot was found on the basis of the total vector (H) measurements at two levels corresponding to the depths of the line formations lambda 5250 A Fe and lambda 6103 A Ca. The spiralling of the horizontal field and its rotation with depth were observed where the vertical field increases with height. The densities of the vertical and horizontal electric currents in the spot are equal to approximately 5000 and approximately 100,000 CGSE respectively. The discrepancy between the height gradients of the vertical field inside the spot was obtained from the measured vertical field at two levels and from the use of the equation div H = O. This discrepancy may be attributed to the difference between the very high resolution at depth and the low resolution on the sun's surface. Author

N75-27994# Princeton Univ., N.J. Dept. of Physics.
RESEARCH ON SOLAR PHYSICS, PULSARS, AND COSMOLOGY Final Report, 1 Jul. 1970 - 31 Dec. 1974
Robert H. Dicke 31 Dec. 1974 8 p refs
(Contract N00014-67-A-0151-0027; NR Proj. 012-605)
(AD-A004198) Avail: NTIS CSCL 03/2

The contract was concerned with solar physics problems involving the solar oblateness, the precision timing of optical pulses from the crab nebula pulsar and the polarization and isotropy of the cosmic microwave background radiation. Author (GRA)

N75-27995# Boston Coll., Chestnut Hill, Mass. Dept. of Physics.
SPECTRAL CORRELATIONS BETWEEN SOLAR FLARE RADIO BURSTS AND ASSOCIATED PROTON FLUXES, 1 Interim Report
Pradip Bakshi and William Barron Oct. 1974 26 p refs

(Contract F19628-72-C-0003; AF Proj. 4643)
(AD-A003683; AFCRL-TR-74-0508; SR-2) Avail: NTIS CSCL 03/2

The present study is directed towards establishing a correlation between certain characteristics of the radio spectrum and the relative intensities of the proton spectrum as measured by peak proton fluxes. This study essentially provides a prediction on the hardness (shallow spectrum) or softness (steep spectrum) of the proton spectrum (peak proton flux vs. energy range). GRA

N75-27996# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 366. PART 1: (PROMPT REPORTS). DATA FOR JANUARY 1975 AND DECEMBER 1974
Hope I. Leighton Feb. 1975 117 p
(COM-75-50193-366-1; SGD-366-Pt-1; NOAA-75031704) Avail: NTIS MF $2.25; HC available from National Climatic Center, Attn: Publications. Federal Bldg., Asheville, N. C. 28801. Subscription $34.50/year includes Part 1 (Prompt Reports) and Part 2 (Comprehensive Reports); $18.00/year for either part including extra issue. $1.40/copy for either part; $1.30 for extra issue CSCL 03B

Solar-geophysical data are given for January 1975 and December 1974. These deal with alert periods, daily solar indices, solar flares, solar radio waves, solar wind measurements, spacecraft observations, solar X-ray radiation, solar proton monitoring, inferred IP magnetic field polarities, daily solar activity centers, sudden ionospheric disturbances, cosmic rays, geomagnetic indices, and radio propagation indices. GRA

N75-27997# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 366, FEBRUARY 1975. PART 2: (COMPREHENSIVE REPORTS). DATA FOR AUGUST 1974 AND JULY 1974 AND MISCELLANEA
Hope I. Leighton Feb. 1975 39 p refs
(COM-75-50193-366-2; SGD-366-Pt-2; NOAA-75031705) Avail: NTIS MF $2.25; HC available from National Climatic Center, Attn: Publications. Federal Bldg., Asheville, N. C. 28801. Subscription $34.50/year includes Part 1 (Prompt Reports) and Part 2 (Comprehensive Reports); $18.00/year for either part including extra issue. $1.40/copy for either part; $1.30 for extra issue CSCL 03B

For abstract, see N75-27996.

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N75-27998 Texas A&M Univ., College Station.
A SEARCH FOR CHARGE ASYMMETRY IN ELECTROMAGNETIC INTERACTIONS OF COSMIC RAY MUONS WITH IRON Ph.D. Thesis
Charles Emil Magnuson 1974 237 p
Avail: Univ. Microfilms Order No. 75-15044

A search for charge asymmetry in electromagnetic interactions of cosmic ray muons with iron was conducted using a wide-gap spark chamber cosmic ray spectrometer. The measurements cover a momentum range from 2 GeV/c to about 200 GeV/c and zenith angles from 50 deg to 90 deg and include 12,309 events. The total charge asymmetry at large zenith angles is 1.019 + or - 0.041. This value does not support the idea that there is a charge asymmetry. Dissert. Abstr.

N75-27999*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SELECTED THEORETICAL STUDIES GROUP CONTRIBUTIONS TO THE 14TH INTERNATIONAL COSMIC RAY CONFERENCE
Jul. 1975 23 p refs Conf. held at Munich, Aug. 1975
(NASA-TM-X-70925; X-602-75-160) Avail: NTIS HC $3.25 CSCL 03B

The galactic distribution of H2 was studied through gamma radiation and through X-ray, optical, and infrared absorption measurements from SAS-2 and other sources. A comparison of the latitude distribution of gamma-ray intensity with reddening data shows reddening data to give the best estimate of interstellar gas in the solar vicinity. The distribution of galactic cosmic ray nucleons was determined and appears to be identical to the supernova remnant distribution. Interactions between ultrahigh energy cosmic-ray nuclei and intergalactic photon radiation fields were calculated, using the Monte Carlo method. L.B.

N75-28000*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COSMIC RAY POSITRON AND NEGATRON SPECTRA BETWEEN 20 AND 800 MeV MEASURED IN 1974
R. C. Hartman and C. J. Pellerin Jun. 1975 23 p refs Submitted for publication
(NASA-TM-X-70923; X-662-75-152) Avail: NTIS HC $3.25 CSCL 03B

A balloon-borne spark chamber magnetic spectrometer was used to measure separate spectra of positrons and negatrons in two flights during summer, 1974. The total electron flux is about 0.3 m(-2) s(-1) sr(-1) MeV(-1) between 70 and 800 MeV, and increases toward lower energies. The positron spectrum decreases sharply toward lower energies from a value of about 0.08 m(-2) s(-1) sr(-1) MeV(-1) at 650 MeV, and only upper limits are obtained for positrons below 200 MeV. At energies above 180 MeV, the spherically symmetric Fokker-Planck equation provides reasonable fits to both the positron and total electron data. At energies below 180 MeV the data are consistent with a continuation of the same diffusion coefficient and local source of negatrons, or a change in the diffusion coefficient to a constant value. Author

N75-28001*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CHARGED PARTICLE RADIATION ENVIRONMENT FOR THE SPACELAB AND OTHER MISSIONS IN LOW EARTH ORBIT
John W. Watts, Jr. and J. J. Wright Jun. 1975 74 p refs
(NASA-TM-X-64936) Avail: NTIS HC $4.25 CSCL 03B

The physical charged particle dose encountered in low earth orbit missions was estimated for orbits of inclinations from 28.5 deg to 90 deg and altitudes from 200 to 800 km. Results indicate that the dose encountered is strongly altitude dependent, with a weaker dependence on inclination. Doses range from 0.006 rads/day at 28.5 deg and 200 km to 2.5 rads/day at 28.5 deg and 800 km behind a 5.0 g/sq cm shield. Geomagnetically trapped protons were the primary source of damage over most of the range of altitudes and inclinations, with galactic cosmic rays making a significant contribution at the lowest altitudes. Author

99 GENERAL

N75-28002*# Joint Publications Research Service, Arlington, Va.
VISIT OF RUSSIAN JOURNALISTS TO AMERICAN SCIENTIFIC CENTERS
Ya. K. Golovanov Washington NASA Jul. 1975 89 p Transl. into ENGLISH from the report "Byl' o Starom I'de: Zametki Zhurnalista o Poyezdke po Nauchnym Tsentram SShA" USSR, 1974 p 5-174 Sponsored by NASA
(NASA-TT-F-16409) Avail: NTIS HC $4.75 CSCL 05K

Observations of how the old ice of many years of the cold war is now thawing due to implementation of the program of peace enunciated at the 24th Congress of the CPSU are reported. The observations were made during a visit in the summer of 1973 of American scientific centers. The visit was completed several days before that of L. I. Brezhnev to the United States and proceeded under the sign of this historic visit. Author

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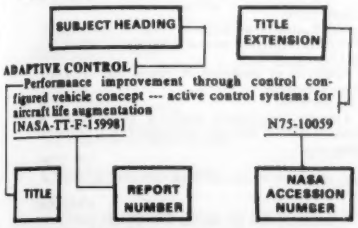

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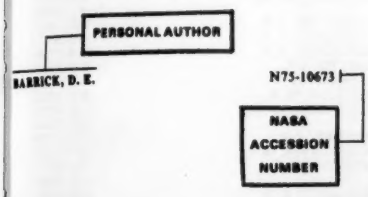

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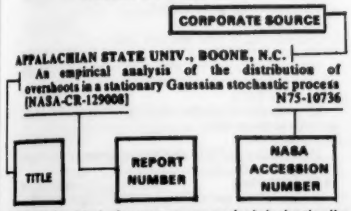

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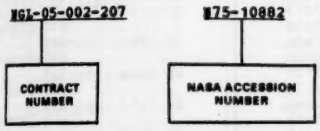

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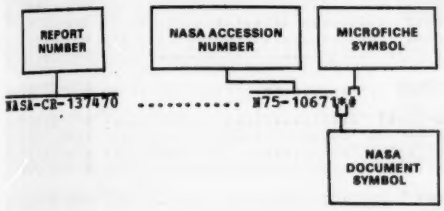

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NASA-TT-F-16454 ..... N75-27724*#
NASA-TT-F-16458 ..... N75-27716*#
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NBS-SP-399-VOL-1 ..... N75-27797 #

NBS-SPECIAL-PUB-400-13 ..... N75-27276 #

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NBS/DF-74/006A ..... N75-27797 #
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NIC-7104-REV-1 ..... N75-27231 #

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NOAA-TM-ERL-WMPO-20 ..... N75-27671 #
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NOAA-TM-NWS-SR-80 ..... N75-27669 #

NOAA-TM-NWSTH-WR-96 ..... N75-27670 #

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NOAA-75031701 ..... N75-27669 #
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NTSB-ARG-74-3 ..... N75-26988 #

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OWRT-A-046-MASS(1) ..... N75-27545 #
OWRT-A-999-PA(3) ..... N75-27604 #

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TRW-24118-6003-RU-00 ..... N75-27566*#

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US-PATENT-APPL-SN-350250 ..... N75-27160*
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US-PATENT-APPL-SN-387266 ..... N75-27328*
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US-PATENT-APPL-SN-440916 ..... N75-27252*
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US-PATENT-APPL-SN-583486 ..... N75-27254*#
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